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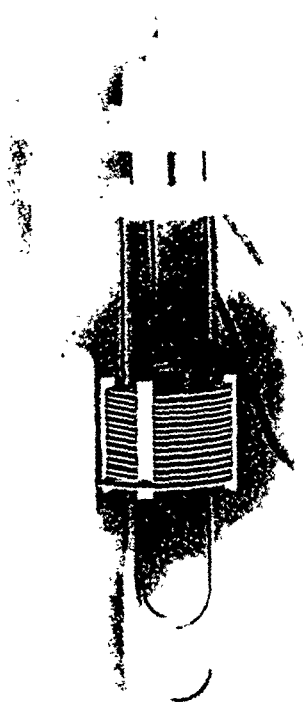
CONTENTS:

Symposium on Tracheo-Bronchial Tuberculosis

INTRODUCTION	1
INTRODUCCION	2
TUBERCULOSIS OF THE TRACHEA AND MAJOR BRONCHI	3
Gertrude Silverman, M.D., Jamaica, Long Island, New York	
SURGICAL PATHOLOGY OF ENDOBRONCHIAL TUBERCULOSIS	18
William A. Meissner, M.D., Boston, Massachusetts	
THE RADIOLOGICAL FINDINGS IN TRACHEO-BRONCHIAL TUBERCULOSIS.....	26
C. C. Birkelo, M.D. and L. A. Poznak, M.D., Detroit, Michigan	
BRONCHOSCOPIC OBSERVATIONS IN TUBERCULOUS TRACHEOBRONCHITIS—Clinical and Pathological Correlation	36
Norman J. Wilson, M.D., Boston, Massachusetts	
CLINICAL ASPECTS OF ENDOBRONCHIAL TUBERCULOSIS	60
Moses J. Stone, M.D., F.C.C.P., Boston, Massachusetts	
PULMONARY RESECTION FOR TUBERCULOSIS COMPLICATED BY TUBERCULOUS BRONCHITIS (Preliminary Report).....	72
Richard H. Overholt, M.D., F.C.C.P., and Norman J. Wilson, M.D., Boston, Massachusetts	
PRESIDENT'S NEW YEAR MESSAGE	93
SEMI-ANNUAL MEETING OF THE BOARD OF REGENTS	94
COMMITTEES MEET TO DISCUSS ORGANIZATION OF SPECIALTY BOARD	95
CHAPTER MEETINGS:	
Cuban Chapter	96
Southern Chapter	96
New York State Chapter	96
New Jersey Chapter	xiii
Illinois Chapter	xiii
Texas Chapter	xiii
POSITION WANTED & POSITION AVAILABLE	xiii

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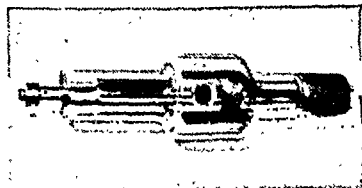
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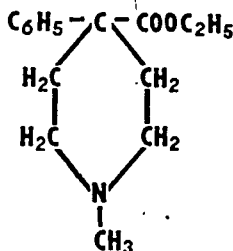
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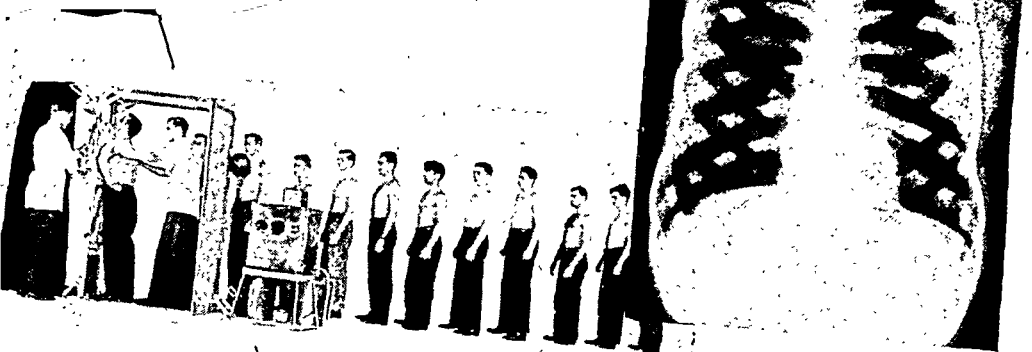
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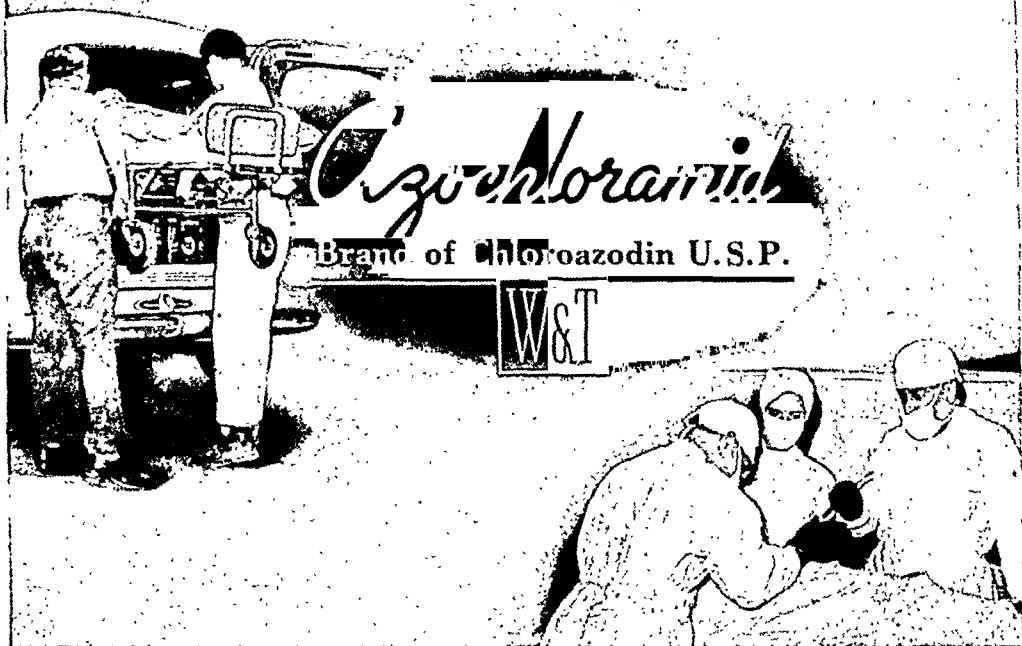
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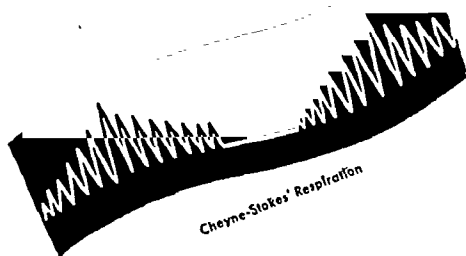
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DISEASES *of the* CHEST

VOLUME XI

JANUARY-FEBRUARY, 1945

NUMBER 1

INTRODUCTION

Symposium on Tracheobronchial Tuberculosis

The symposium on tracheobronchial tuberculosis which was presented at the annual meeting of the College is now being published in this issue. Its purpose is not only to acquaint the reader with the latest aspects of this disease but also, to direct and focus attention to this condition and thus invite further discussion and investigation. Not all of the answers are given in the following pages. Indeed, many are the problems before us that await the ingenuity of the pathologists, the clinicians, as well as the surgeons for their solution.

For instance, the pathologists could well inquire and investigate why 5 to 15 per cent of the patients develop tuberculous bronchitis and the remainder do not. Why is the disease more prevalent in women than it is in men? While some investigators, notably Cadden, Salkin and Edson, do not find a great discrepancy in the incidence between male and female, the majority of observers are impressed with the preponderance in females. The site of the lesions apparently also has a certain predilection. As shown by Silverman and Meissner, the distal small bronchi are the sites of the early lesions which later advance toward the larger bronchi. Wilson also points to the left main bronchus as the seat of greater involvement than that of the right. The clinician can certainly study much more closely the effect of aerodynamics caused by the physiological changes of endobronchitis, especially as it affects artificial pneumothorax therapy. The relationship of partial or complete bronchial obstruction to healing as well as to anaerobic infection, empyema, bronchial fistula, and closure of cavities, makes a fertile field for investigation.

Bronchoscopic diagnosis is still far from satisfactory as its field of vision is much too limited. The result of bronchoscopic treatment with silver nitrate awaits still further evaluation. The question of whether pneumothorax therapy, extensive thoracoplasty or resection is the treatment of choice will be the concern of clinicians, bronchoscopists and surgeons for years to come. One thing, however, is clear and that is that bronchoscopy forms an integral part of diagnosis and intelligent treatment of pulmonary tuberculosis. To this end, trained bronchoscopists especially interested in the field of tuberculosis must be a part of any well constituted staff of the sanatorium. There are still many sanatoria, either through neglect, or because they are situated away from medical centers, which remain without the benefit of such examinations. Is it too much to hope that the future chest specialist will not only be expert with his stethoscope, x-ray interpretations and clinical evaluation, but that he will also be adept with the bronchoscope?

MOSES J. STONE, M.D., F.C.C.P.

Boston, Massachusetts.

INTRODUCCION

Bronquitis Tuberculosa

Se publica en este número los comentarios sobre la bronquitis tuberculosa presentados durante la reunión anual del Colegio. Su propósito no es solamente el de familiarizar al lector con los aspectos más recientes de esta enfermedad, sino también el de dirigir y enfocar la atención hacia esta condición morbosa, y provocar de este modo más discusión e investigación. En las páginas siguientes no se dan todas las contestaciones, pues son muchos los problemas que se nos presentan cuyas soluciones aguardan la ingeniosidad tanto de los patólogos y clínicos como de los cirujanos.

Por ejemplo, los patólogos podrían inquirir e investigar por qué la bronquitis tuberculosa se desarrolla en del 5 al 15 por ciento de los pacientes y no en su totalidad. ¿Por qué la enfermedad prevalece más entre las mujeres que entre los hombres? Aunque algunos investigadores, especialmente Cadden, Salkin y Edson, no encuentran que exista gran discrepancia entre la incidencia en hombres y mujeres, la mayoría de los observadores sí notan la preponderancia de la enfermedad en las mujeres. Aparentemente la localización de las lesiones también manifiesta cierta predilección. Silverman y Meissner han demostrado que las lesiones más tempranas aparecen en los bronquios más pequeños y que después avanzan hacia los bronquios mayores. Wilson también indica que la invasión de la rama bronquial principal izquierda es mayor que la de la derecha. Es indudable que el clínico puede estudiar mucho más íntimamente, y con provecho, el efecto aerodinámico causado por las alteraciones fisio-patológicas de la endobronquitis, especialmente en lo que afecta al neumotórax artificial. La relación que guarda la obstrucción bronquial, completa o parcial, tanto con la curación como con la infección anaerobia, el empiema, la fistula bronquial, el cierre de cavernas, etc., presenta un campo fértil para la investigación.

El diagnóstico broncoscópico todavía deja mucho que desear, pues su campo de visión es demasiado limitado. El resultado del tratamiento broncoscópico con nitrato de plata no puede todavía ser justipreciado definitivamente. El problema de si el tratamiento de elección es el neumotórax artificial, la toracoplastia extensa o la resección, ocupará a los clínicos, broncoscopistas y cirujanos por muchos años. Empero, hay una cosa clara, y es que la broncoscopia constituye parte integral del diagnóstico y del tratamiento inteligente de la tuberculosis pulmonar. Con este fin, broncoscopistas expertos, interesados especialmente en la tuberculosis, deben formar parte del cuerpo médico de todo sanatorio bien constituido. Existen todavía muchos sanatorios que, ya por descuido o porque se encuentran situados lejos de centros médicos, no cuentan con las ventajas de estos exámenes. ¿Es, acaso, mucho esperar que el futuro especialista del pecho sea no solamente experto en el uso de su estetoscopio, en sus interpretaciones radiológicas y en su juicio clínico, sino también apto en el uso del broncoscopio?

MOSES J. STONE, M.D., F.C.C.P.

Boston, Massachusetts.

Tuberculosis of the Trachea and Major Bronchi*

GERTRUDE SILVERMAN, M.D.
Jamaica, Long Island, New York

INTRODUCTION

Tuberculosis of the trachea and major bronchi has long been known to the pathologist. Detailed historical reviews have been given by Bugher, Littig, and Culp,¹ and by Wilber,² the references dating as far back as the beginning of the 19th century. Since post mortem examination of patients dying of tuberculosis may reveal lesions in every organ, it was to be expected that the trachea and bronchi would not go unscathed. The pathologist, therefore, accepted these lesions casually. With the advent of bronchoscopy, however, interest was stimulated, for it was realized that the presence of lesions in the trachea and bronchi would greatly influence the therapy and course of the pulmonary disease. The use of the bronchoscope and bronchography permitted the study of large series of cases, and, during the past decade, important contributions were made by Eloesser,³ Riggins,⁴ Myerson,⁵ Epstein and Ornstein,⁶ Samson,⁷ Barnwell, Littig and Culp,⁸ Warren, Hammond and Tuttle,⁹ Cohen and Wessler,¹⁰ Hawkins,¹¹ and others. Concomitant with this revival in clinical interest, detailed pathological reports began to appear, such as those by Reichle and Frost,¹² Bugher, Littig and Culp,¹ Auerbach,¹³ Wilber,² and Chia-Ssu Huang.¹⁴ A good comprehensive review of the entire subject was given by Jenks.¹⁵

MATERIAL STUDIED

This paper includes the study of 110 consecutive cases autopsied at Triboro Hospital for Tuberculosis, with death due to tuberculosis. All had tuberculosis in the lungs.

Routine microscopic sections were taken in every case from the anterior and posterior wall of the trachea, the carina, and both main bronchi. In addition, any grossly suspicious area was studied microscopically.

Of the cases studied, 94 were white, 13 Negro, 2 Puerto Rican, and 1 Malayan.

83 were male, 27 female.

The age range was from 20 to 70 years.

PATHOLOGY

Gross and microscopic lesions found in the trachea and the main bronchi were both specific and non-specific. The specific lesions

*Read before the Tenth Annual Meeting, American College of Chest Physicians, Chicago, Illinois, June 12, 1944.

represented varying degrees of exudative, caseous, proliferative and fibrotic tuberculosis and could occur in any combination in the one tracheobronchial tree. The following are the types of lesions seen:



Figure 1



Figure 2

Figure 1: Trachea with grossly reddened and granular mucosa. Minimal specific lesion is represented by a small tubercle situated between the glands.—Figure 2: Trachea. Tubercle surrounding gland duct.



Figure 3: Shallow superficial tuberculous ulcerations on anterior wall of trachea.

1) Diffuse reddening and edematous thickening of the mucosal lining. Microscopic examination revealed congestion, and a dense lymphocytic infiltration. This was considered non-specific. It frequently accompanied specific lesions.

2) Small microscopic tubercles. These were situated between the glands, surrounded the gland ducts, or were found immediately beneath the epithelium (Figs 1 and 2).

3) Shallow microscopic ulcerations with denudation of the mucosal epithelium, and a lymphocytic infiltration in the base. A few of these, when stained for tubercle bacilli, revealed numerous acid-

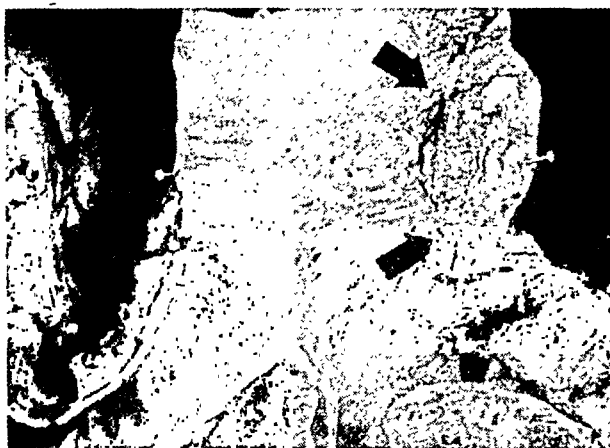


Figure 4: Arrows point to the severe ulceration on the posterior wall of the lower portion of the trachea. This is the site of predilection.



Figure 5: Severe tuberculosis of trachea, main bronchi, left upper lobar bronchus, and branches to cavity, with deep ulceration and extension to cartilage.

5) Gross ulcerations, with tuberculous granulation tissue in the base. In the trachea these were most severe in the lower portion and on the posterior wall. The ulcers were few and shallow, or numerous, confluent, very extensive, at times eroding the cartilage (Figs. 3, 4, 5, 6).

This was the most frequent finding.

6) Ulceration with extensive tuberculous granulation tissue, accompanied by fibrosis, and leading to some narrowing of the lumen. The degree of fibrosis was usually not marked in the trachea, and was more appreciable in the main bronchi. Only in the branches of the main bronchi, draining tuberculous cavities, could this lesion be seen to any advanced degree (Figs. 7, 8).



Figure 10: Left main bronchus with proliferative submucosal tubercle. This section also shows diffuse fibrosis of the wall of the bronchus.

7) Diffuse fibrotic thickening of the bronchial wall, with some narrowing, and the presence of superficial or submucosal tubercles. This, also, was not seen to as an advanced degree in trachea or main bronchi, as in their branches (Figs. 9, 10).

8) Scarring due to healing. No such lesion was noted in the trachea. It was recognized infrequently in the main bronchi (Fig. 11). Only in the branches of the lobar bronchi, draining tuberculous cavities, was complete occlusion due to healing and fibrosis seen.

No sharp line can be drawn between any of the above specific lesions since they are simply gradations of the same process.

INCIDENCE

In the 110 cases studied, 66 were found to have tuberculosis of the trachea and/or one or both of the main bronchi, an incidence of 60 per cent. It was apparent that the more detailed the histological examination the more frequent the positive cases.

There was no noteworthy predisposition in any one sex, race, or age group.

The cases could be subdivided, somewhat arbitrarily, as follows. We repeat, only the trachea and the main bronchi down to their subdivisions into the lobar bronchi are included in the following figures.



Figure 11: Scarring in the left main bronchus, end result of tuberculosis. Wall in region of the scar is thin and no active tuberculosis was present at this site. Case with inspissated cavity in left upper lobe and complete fibrotic occlusion of draining bronchus.

1) Cases with medium-sized to huge pulmonary cavities, without broncho-pleural fistulae (69):

- 33 had gross ulcerations
- 2 had gross submucosal tubercles
- 14 had only microscopic lesions
- 20 had no lesions

Incidence 71%

2) Cases with medium-sized to huge pulmonary cavities, with broncho-pleural fistulae (13):

- 4 had gross ulcerations
- 1 had gross submucosal tubercles
- 4 had only microscopic lesions
- 1 had healed scarring
- 3 had non-specific microscopic ulcerations

Incidence approximately 70%

3) Cases with small pulmonary cavities (18):

- 1 had a few small ulcerations
- 2 had only microscopic lesions
- 15 had no lesions

Incidence approximately 17%

4) Cases with pulmonary silico-tuberculosis (3):

- (a) with extensive cavitation
 - 1 had gross ulcerations
 - 1 had thickening and gross submucosal tubercles
- (b) without extensive cavitation
 - 1 had no lesions

5) Cases with predominantly miliary hematogenous dissemination in the lungs (7):

- (a) with small cavity formation
 - 2 had only microscopic lesions
(including Case 2, quoted below)
- (b) without cavity formation
 - 1 had only microscopic lesions
(Case 3, quoted below)
 - 4 had no lesions

It can be seen, from the above figures on incidence, that lesions in the trachea and main bronchi were most frequent in cases having large pulmonary cavities, including those with broncho-pleural fistulae.

PATHOGENESIS

Primary tuberculosis of the trachea and main bronchi must be extremely rare. The lesions are usually secondary and may be due to:

- 1) Direct surface implantation with the tubercle bacilli.
- 2) Direct extension from neighboring tuberculous tissue, e.g., lymph nodes.
- 3) Bacilli brought from other foci via lymphogenous or hematogenous routes.

1) *Direct surface implantation with the tubercle bacilli.* Tuberculous lesions in the trachea and main bronchi were most frequent in cases having large pulmonary cavities, including those with bronchopleural fistulae. It is in these cases that the quantity of bacilli-laden sputum is most abundant. Direct surface implantation would, therefore, appear to be the most obvious mode of infection. Reichle and Frost,¹² state that the defensive barriers of the bronchi, viz. cilia, mucous glands, and bronchial epithelium prevent this type of infection. However, the constant irritation of an abundant sputum, and, as in the cases of broncho-pleural fistulae, an immobile lung with a mixed infection, should readily break down these barriers. The non-specific ulcerations found, particularly, in the cases with broncho-pleural fistulae, suggest a devitalization of the surface with implantation of numerous tubercle bacilli in the ulcer base.

2) *Direct extension from neighboring tuberculous tissue.* Direct extension from neighboring caseous lymph nodes has frequently been reported. One case autopsied at Triboro Hospital during the past year showed such extension into the right middle lobe bronchus.

One of the causes of bronchial stenosis may be the erosion of the bronchial wall by an old calcified tuberculous lymph node. This has been recognized clinically, and at the autopsy table. One such case is included in Cohen and Wessler's series.¹⁰ The following report illustrates what is probably the late result of such an occurrence.

Case 1. A-104. A 59 year old white female had contracted pulmonary tuberculosis 20 years ago. It apparently had been readily controlled and arrested. A year before her death a radical mastectomy was done for carcinoma of the breast. Subsequent to this, she developed active pulmonary tuberculosis and was admitted with extensive cavitation throughout the right side. Autopsy revealed a diverticulum of the right main bronchus, 1 cm. in size, and 7 mm. deep. Its base was formed by an anthraco-fibrotic lymph node (Fig. 12).

It seems reasonable to postulate that there had been, at one time, erosion of the bronchial wall by the neighboring lymph nodes possibly with the extrusion of calcified particles.

3) *Bacilli brought from other foci via lymphogenous or hematogenous routes.* No indisputable case due to the transport of organisms via lymphatics or blood vessels was noted. The following two reports illustrate cases with miliary hematogenous dissemination in the lung in which lesions of the trachea or main bronchi were found.

Case 2. With Single Cavity Formation. A-86. A 34 year old white male died with generalized lympho-hematogenous tuberculosis, and a miliary dissemination in the lungs. The sputum concentrates were negative. The last sputum examined showed 1 colony on culture.

At autopsy the lungs revealed a miliary dissemination. One caseous right paratracheal lymph node eroded into the right upper lobe with resultant small cavity formation. The bronchus draining this cavity showed tuberculosis in its wall. Microscopic examination of the main bronchi at the carina revealed the presence of a small isolated tubercle between the glands (Fig. 13-a). The lymph nodes below the carina were caseous, and erosion of the cartilage by direct extension from the underlying tuberculous tissue could be seen (Fig. 13-b).

In spite of the fact that the general pathogenesis in the case is one of lympho-hematogenous dissemination, and that some direct extension from the underlying lymph node was seen, the submucosal tubercle may still be due to surface implantation with the tubercle bacilli. The source of the bacilli would be the pulmonary cavity.

Case 3. Without Cavity Formation. A-51. A 27 year old white female



Figure 12: (Case 1). Large diverticulum in right main bronchus probably due to old erosion of wall from underlying lymph node. The base of diverticulum is formed by anthraco-fibrotic lymph node.

died with generalized lympho-hematogenous tuberculosis and a miliary dissemination in lung. Sputum was positive, Gaffky 2.

At autopsy the lungs revealed a miliary dissemination without any cavity formation. Microscopic examination showed extensive tuberculosis in the walls of the small bronchi, with denudation of the mucosa. Microscopic examination of the trachea and main bronchi revealed one superficial ulceration in the left main bronchus (Fig. 14). The lymph nodes showed caseous tuberculosis.

Here, again, in spite of the fact that the general pathogenesis in this case was one of lympho-hematogenous dissemination, the superficial isolated ulcer in the left main bronchus, may still be due to surface implantation with tubercle bacilli. The severe tuberculosis in the small bronchi afforded ample source for the bacilli.

TUBERCULOSIS OF BRONCHI DRAINING CAVITIES AND ITS RELATIONSHIP TO TUBERCULOSIS OF TRACHEA AND MAIN BRONCHI

The high incidence of severe tuberculosis of the lobar bronchi and those branches which drain cavities is an important fact favoring the theory of implantation mode of infection. Direct extension from neighboring tuberculous tissue is also readily afforded in these bronchi. Though an intensive investigation of the bronchi draining cavities was not made in this study, it was evident that bronchial tuberculosis was almost constant and most advanced in this group. Many cases showed the process to diminish in severity as the main bronchi and trachea were approached (Fig. 7). In other words, lesions of trachea and main bronchi are usually later lesions in the course of pulmonary tuberculosis and, therefore, apt to be less advanced.



(A) (B)
Figure 13: (Case 2). Section at carina. (A) Small isolated tubercle between the glands. (B) Erosion of cartilage by direct extension from underlying caseous lymph node.



Figure 14: (Case 3). Superficial tuberculous ulceration present in left main bronchus. Miliary dissemination in lungs. Tuberculosis of the small bronchi. No cavity formation.



Figure 15: Tuberculosis of larynx and trachea. Major involvement of the trachea is in the portion just below the larynx.

LARYNGEAL TUBERCULOSIS AND TUBERCULOSIS OF TRACHEA AND MAIN BRONCHI

The larynx was examined, grossly and microscopically, in 95 of the 110 cases studied.

Of these, 54 had tuberculosis of the larynx, an incidence of about 57 per cent.

Of the 54 cases with laryngeal tuberculosis, 13 had no tuberculosis of the trachea or main bronchi.

On the other hand, 18 cases with a negative larynx had tracheo-bronchial tuberculosis.

Therefore, there is no direct correlation between laryngeal and tracheo-bronchial tuberculosis. Only occasionally was the tuberculosis of the trachea most severe in its upper portion, below the larynx, where downward extension may have occurred (Fig. 15).

Both the laryngeal and the tracheo-bronchial tuberculosis appear to be dependent on the pulmonary lesions.

DISCUSSION

The results of this study tend to confirm the findings of the majority of investigators.

One of the confusing points in the literature is the application of the term "major bronchi." Observations and conclusions based on the study of only the right main bronchus and the left main bronchus must of necessity differ from those studies which include the lobar bronchi and their subdivisions.

Investigation of only the trachea and main bronchi is an inadequate approach to the subject. Close correlation with the findings in the rest of the bronchial tree and the case as a whole is necessary.

Autopsy findings and percentages obviously cannot coincide with clinical investigations. The bronchoscopist is limited to gross inspection and the study of biopsy fragments. Non-specific reactions, such as congestion and edema, will be pronounced in the living state, whereas the small specific tubercle and ulceration will not be discerned. On the other hand, post mortem examinations have their own limitations. Cases with bronchial tuberculosis and minimal pulmonary tuberculosis are not seen by the pathologist. Autopsy studies will reveal clinical tracheo-bronchial tuberculosis overshadowed by terminal lesions, or only terminal manifestations. Some of the microscopic tubercles or shallow specific ulcerations may be lesions which occurred just before death. Clarification of the problem can only be obtained by closely correlated clinical and pathological studies.

Unquestionably the surface implantation, direct extension, lymphogenous, and hematogenous modes of infection can all play a

part in the pathogenesis of tracheo-bronchial tuberculosis. The most common mode of infection appears to be surface implantation with the tubercle bacilli.

SUMMARY AND CONCLUSIONS

Tuberculosis of the trachea and both main bronchi is a frequent finding in post-mortem examinations of patients dying of tuberculosis.

Tuberculous ulcerations are the most common lesions. Microscopic lesions help to swell the positive figures.

Thickening due to tuberculous granulation tissue and fibrosis, with resultant stenosis, is an infrequent autopsy finding in the trachea, is occasionally noted in the main bronchi, but is often seen to an advanced degree in the bronchi draining the cavities.

Tracheo-bronchial tuberculosis is most common in those cases with large pulmonary cavities and is probably due to surface implantation with the tubercle bacilli.

The presence of tracheal or main bronchial tuberculosis usually signifies tuberculosis of greater severity within the lungs.

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Resumen y Conclusiones

Tuberculosis de la tráquea y de ambas ramas bronquiales principales es hallazgo frecuente en las autopsias de pacientes que han muerto de tuberculosis.

Las lesiones más comunes son las ulceraciones tuberculosas. Lesiones microscópicas aumentan las cifras positivas.

Engrosamiento debido a tejido de granulación tuberculoso y fibrosis, con la estenosis resultante, es un hallazgo autopsico que es raro en la tráquea y que sólo ocurre ocasionalmente en las ramas bronquiales principales, pero que se observa frecuentemente en un grado avanzado en los bronquios que desaguan las cavernas.

La tuberculosis tráqueo-bronquial es más común en los casos con grandes cavernas pulmonares y es probablemente causada por siembras de bacilos tuberculosos en la superficie.

La presencia de tuberculosis de la tráquea o de las ramas bronquiales principales generalmente indica tuberculosis intrapulmonar de mayor gravedad.

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Surgical Pathology of Endobronchial Tuberculosis**

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An additional approach to the study of the pathology of endobronchial tuberculosis has been provided by an opportunity to examine lungs surgically removed for pulmonary tuberculosis. There has recently been an increased realization of the frequency and importance of tuberculosis of the larger bronchi, which makes it essential that the pathology and pathogenesis of this condition be understood as completely as possible. The formation of the tuberculous ulcer of the bronchial mucosa and the genesis of the granulomatous and fibrous stenosis of the bronchial lumen have been discussed by Reichle and Frost,¹ Bugher, Littig and Culp,² Myerson,³ Wilber,⁴ and others. However, most of these studies have been made on necropsy material in which there was often widespread fatal disease. A study of this condition in specimens taken from living patients may help clarify some aspects of the problem and assist the surgeon in the evaluation of his cases of pulmonary tuberculosis from the standpoint of lung resection.

The general pathology of endobronchial tuberculosis has been described in the references noted and is discussed in Silverman's paper in this issue. Therefore, the scope of this paper will be limited to the consideration of certain aspects of the surgical pathology of this lesion. Of particular interest are such problems as the state of the secondary bronchi when a lobar or a mainstem bronchus is involved, the role of parenchymal tuberculosis as the exciting factor of the endobronchial lesion, and the duration and type of this parenchymal lesion. The incidence and extent of involvement of the hilar lymph nodes when endobronchial disease is present is of particular concern to the surgeon in determining the feasibility of lung resection.

MATERIAL AND METHODS

The material for this study consisted of 60 lungs or lobes of lungs which were resected by Dr. Richard H. Overholt and associates. The resection was done for various indications, which are discussed elsewhere,⁵ but all were performed as a method of treatment of pulmonary tuberculosis.

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Prior to pathologic examination and dissection, the lungs were fixed in 10 per cent formalin. Fixation included the intrabronchial injection under low pressure of 10 per cent formalin. Blocks for microscopic study were taken, as far as possible, from all main, lobar, and segmental bronchi, from parenchymal lesions, and from at least three hilar lymph nodes. In some cases serial blocks of various bronchi were taken. The sections were stained with hematoxylin and eosin. Acid-fast stains were done where thought necessary.

By this method of examination, tuberculous endobronchitis was found in the main stem, lobar, or segmental bronchi in 31 or about half of the cases. It is these 31 cases with which this report is primarily concerned.

RESULTS

The results of the study of the 31 cases showing endobronchial disease are summarized in Table I.

It should be pointed out that emphasis cannot be placed on these figures from a statistical point of view. This is not only because the series is not large enough, but also because the cases were selected surgically and both the surgical indication and the type of disease present were too variable to permit statistical comparison. However, certain trends are obvious.

The age and sex distribution of this group is in conformity with the general impression of many observers. Females in the third and fourth decades were particularly affected.

The presence of positive sputum in all cases and the frequent

TABLE I

Part resected	left lung	15
	right lung	9
	lobe or lobes	7
Age	15-57 years	
	average 32 years	
Sex	females	24
	males	7
Sputum	positive	31
Bronchoscopy	endobronchial tuberculosis	15
Duration of symptoms	7 weeks to 11 years	
Bronchus involved	segmental	31
	lobar	21
	main stem	13
Hilar lymph nodes	tuberculosis	27
	inadequately examined	4
Cavities	present	20

bronchoscopic diagnosis of endobronchial tuberculosis are not surprising findings.

While the duration of symptoms of pulmonary tuberculosis varied from seven weeks to eleven years, one third of the patients had these symptoms for less than one year. This is significant since it shows that endobronchial lesions do not develop only in patients who have had symptoms of parenchymal disease over a long period. Endobronchial tuberculosis may be an early complication.

The bronchial lesion varied from an occasional tubercle in the mucosa, submucosa, or about the deeper parts of the mucous glands to the presence of stenosing tuberculous granulation tissue often completely replacing the mucosa and, at times, associated with fibrosis. All gradations were found between these two extremes (Figs. 1, 2, 3). The diagnosis of endobronchial tuberculosis was not made unless typical tubercles were found and if there was any doubt, acid-fast stains for tubercle bacilli were performed. When a section of bronchus showed only a few scattered tubercles, there was usually associated a slight submucosal edema and a scattering of plasma cells and lymphocytes in the submucosa, but rarely ulceration of the epithelium. Even with moderately extensive tuberculous involvement there was at times no ulceration of the overlying epithelium and when ulceration occurred it was focal and often superficial. With more severe involvement, tuberculous



Figure 1



Figure 2

Fig. 1: Slight endobronchial tuberculosis. Note submucosal tubercles and tubercle near gland. (Hematoxylin and eosin, X 19).—*Fig. 2:* More advanced endobronchial tuberculosis with considerable cellular infiltrate. (Hematoxylin and eosin, X 19).

granulation tissue was formed which not only destroyed the epithelium but replaced the entire mucosa and submucosa and projected into the lumen so as to produce a stenosis.

There was apparent continuity of disease from the point of endobronchial tuberculosis nearest the hilum through the segmental bronchi to a parenchymal lesion. Thus, whenever there was tuberculous bronchitis of a main stem bronchus, it was also found in a lobar bronchus; when it was found in a lobar bronchus it was also present in one or more of its segmental bronchi. In spite of the apparent continuity of bronchial involvement, the severity of the disease varied considerably in different parts of the same bronchus or bronchial system. At times, a severe involvement of a lobar bronchus was found with only minimal lesions in its segmental bronchus; similarly a severe involvement of the mainstem bronchus was at times present with relatively little disease of the lobar and segmental bronchi. The interesting point is the involvement along the bronchus all the way to the parenchymal focus, although the disease seemed to manifest itself more severely in some areas along its course.

In 20 cases the parenchymal lesion from which the bronchial disease arose was a cavity; in the remainder it was a focus of caseation of varying size and age. A discussion of the condition



Figure 3



Figure 4

Fig. 3: Marked endobronchial tuberculosis with destruction of mucosa. (Hematoxylin and eosin. X 19).—Fig. 4: Hilar lymph node with typical extent of tuberculous involvement. (Hematoxylin and eosin. X 24).

of the rest of the parenchyma distal to the bronchial lesions is not included in the present study.

In 27 of the 31 cases it was possible to examine three or more of the hilar lymph nodes microscopically. In each of these 27 cases at least one and usually several lymph nodes showed tuberculosis. The extent of the disease was slight, only in one instance was there caseation. The common picture was a scattering of more or less discrete tubercles (Fig. 4). There was never any suggestion of direct extension of disease from the lymph node to the bronchus.

COMMENT

From the results of this study it appears that tuberculosis of the larger bronchi is the result and a complication of parenchymal tuberculosis. It cannot yet be said which cases will develop endobronchial tuberculosis. The primary parenchymal focus may be large or small and is not necessarily a cavity. The most likely time of the development of endobronchial disease is unknown, since in this series it arose after either a short or a long duration of symptoms of pulmonary tuberculosis.

The observation of such frequent tuberculosis of the hilar lymph nodes (a similar involvement was also found in many of the cases showing no endobronchial disease), proves lymphatic drainage or extension of tubercle bacilli from the pulmonary focus to the hilum of the lung. This is not surprising since it is well known that tuberculosis often spreads by lymphatics. Many of the lymphatics



Fig. 5: Bronchial wall from a case of endobronchial tuberculosis to show prominent lymphatics. (Iron hematoxylin and eosin. X 55).

of the lung drain down the wall of the bronchus; the submucosa of the bronchus is also rich in lymphatics (Fig. 5). Thus, the entire course of a bronchus, including segmental, lobar and mainstem, which leads from a parenchymal lesion, is potentially subject to tuberculosis if the tubercle bacilli will but lodge in its wall. The area nearest the pulmonary disease is obviously more subject to infection which accounts for the greater incidence of involvement of segmental bronchi.

The earliest lesion found in tuberculous bronchitis consists of scattered tubercles, either in the mucosa, submucosa or about the mucous glands. The frequent involvement about the mucous glands has been pointed out by Reichle and Frost.¹ Such a slight bronchial infection may be a common accompaniment of pulmonary tuberculosis. However, the bronchus has such an ability to heal that even when superficial ulceration takes place, there is often not irreparable damage to the bronchial mucosa. Condon⁶ has shown that bronchial epithelium may regenerate rapidly if there is not too much damage to the submucosa. At times, whether because of more massive infection or decreased resistance, a tuberculous granulation tissue replaces the bronchial mucosa and submucosa and a stenosis results. Complete healing cannot then take place and scar tissue forms which, even if no longer tuberculous, still maintains a stenosis. An area of such severe endobronchial tuberculosis becomes independent of its parent parenchymal lesion and acts as a metastatic focus for further dissemination of tubercle bacilli. The area of extensive involvement is not necessarily diffuse, as pointed out, but may be limited to one or more foci in the bronchial system.

Infection of the bronchus by direct implantation of tubercle bacilli on the mucosa or in the crypts of the mucous glands has been emphasized by Huang⁷ and others. The presence of positive sputum in all cases in this series would seem to confirm this view if it were not for the fact that bronchial disease itself may give rise to positive sputum. Such an implantation infection may well occur, but it was not possible from this study to estimate its incidence. Even if the mucosa is infected by implantation, the submucosal lymphatics described above still remain an important factor in the subsequent spread of the disease.

Hematogenous bronchial infection and direct extension of parenchymal disease into a large bronchus are not generally thought to be frequent and were not the cause of endobronchial disease in this series. Epstein and Ornstein⁸ suggest that the bronchial infection occurs by extension from a tuberculous lymph node. This seems an unlikely mechanism in adult tuberculosis. In none of the cases of this series did this appear to be a contributing factor;

rather, the disease in both the lymph nodes and in the bronchus seemed more the result of the same lymphatic extension. While the hilar lymph nodes were frequently tuberculous, the involvement was of a slight degree.

SUMMARY AND CONCLUSIONS

1) A study of the bronchi of 60 lungs or lobes which were surgically resected for pulmonary tuberculosis showed tuberculosis of the larger bronchi in 31 of the cases.

2) Endobronchial tuberculosis is a condition secondary to parenchymal tuberculosis of the lung.

3) This parenchymal focus is of variable size and duration and is not necessarily a cavity.

4) Whenever parenchymal tuberculosis exists there is the potentiality of infection of the entire bronchial system leading from this area.

5) Different portions of the same bronchial system may be affected with varying severity.

6) Endobronchial tuberculosis may be present without epithelial ulceration.

7) The lymphatics of the bronchial wall play an important role in the infection of the bronchi and in the spread of the disease.

8) Tuberculosis of the hilar lymph nodes is a common finding when endobronchial tuberculosis is present but is of minor degree.

Resumen y Conclusiones

1) Un estudio de los bronquios de 60 pulmones o lóbulos que fueron extirpados quirúrgicamente por tuberculosis pulmonar, reveló tuberculosis de los bronquios mayores en 31 de los casos.

2) La tuberculosis endobronquial es un estado secundario a la tuberculosis del parénquima pulmonar.

3) Este foco en el parénquima es de tamaño y duración variables y no es necesariamente una caverna.

4) Cuandoquiera que haya tuberculosis del parénquima existe la posibilidad de infección del entero sistema bronquial de desagüe de esta zona.

5) La gravedad de las lesiones en diferentes partes del mismo sistema bronquial puede ser variable.

6) La tuberculosis endobronquial puede existir sin ulceración del epitelio.

7) Los vasos linfáticos de la pared bronquial desempeñan un papel importante en la infección de los bronquios y en la propagación de la enfermedad.

8) Tuberculosis de los ganglios linfáticos hiliares es un hallazgo común cuando existe tuberculosis endobronquial, pero es de grado menor.

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The Radiological Findings in Tracheo-Bronchial Tuberculosis^{*.*}

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The existence of tuberculous lesions within the trachea and bronchi has been known for a long time, but it is only in the past five or six years that they have received much attention. This attention should be credited largely to Samson and others who made extensive studies of these lesions in the living subject by bronchoscopic examination.

At the post-mortem examination, endo-bronchial tuberculosis is commonly found in small and large bronchi near cavities which they drain, and less commonly at points distant from cavities. Wherever infected material remains long in contact with the mucous membrane of the bronchus, tuberculous lesions are likely to form, and the areas which are most exposed will naturally be those which are close to cavities, or in the small bronchi, where expulsion of the infected and often viscid excreted material is difficult. Main bronchi as well as the lower trachea may receive much excreted material from several cavities and smaller bronchi, and they are also common locations for tracheo-bronchial tuberculosis. The disease may be found anywhere in the trachea or bronchial system, but with the greatest frequency near cavities.

From microscopic study of this type of tuberculous lesion, we learn that the earliest or first lesion is a sub-epithelial tubercle. This tubercle may extend and grow by production of tuberculous granulation tissue until a tuberculoma has formed within the bronchus. Such tuberculomas vary in size from that of a pinhead to one large enough completely to occlude a bronchus. Other tubercles will extend and multiply along the bronchial mucosa with resulting necrosis and ulcerations. Such ulcerations are more common than the formation of tuberculomas and these ulcers may also vary in size from a very small, denuded area to a very large, undermined, ulcerated lesion. Many such tuberculous ulcerations will in time heal with scar tissue formation which contracts and produces stenosis, sometimes partial and, again, it may become complete.

It should also be remembered that the tracheo-bronchial system is not composed of tubes of a fixed caliber, but that the size of

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the lumen is definitely altered during the respiratory cycle. For this reason, an endo-bronchial lesion may be of such size as completely to occlude a bronchus during expiration but allow air to enter during inspiration.

Bronchoscopy is the method of choice at the present time, both for the finding and the treatment of the tracheo-bronchial lesion. In some hospitals for the tuberculous patient, all new admission cases have been bronchoscoped. From such examinations it has become possible to form a fair estimate of the incidence of this type of tuberculosis. In most hospitals it is quite impossible so to examine all new admissions and one must rely on the X-ray examination and physical findings in selecting the cases for bronchoscopy.

In this presentation, only the radiological findings suggesting endobronchial disease will be considered. It should be remembered that these findings will depend much upon the type and extent of the tracheo-bronchial lesion present. Some of these radiological findings have become so familiar to most of us that we are able to put a fair estimate on their worth. Others, less important indications, have similarly been discarded and will not be mentioned here.

For the sake of convenience we can divide these X-ray findings into two groups; namely, the direct signs such as we find in the



Fig. 1: 7-22-'42: No. 12170

Fig. 2: 4-14-'43: No. 12170

Fig. 1: Large area of consolidation in left upper lobe. Occlusion suspected. Bronchoscoped 7-30-'42 and stenosis of left main bronchus found.—Fig. 2: Same case as Fig. 1. Consolidation disappeared after treatment of bronchial lesion.

routine filming of the chest, and the indirect signs where we use the X-ray findings as well as certain clinical observations.

Direct signs:

1. Atelectasis.
2. Sudden consolidation of a lobe under collapse.
3. Sudden spread of a lesion apparently controlled.
4. Blocked cavity.
5. Far advanced disease.

Indirect signs:

1. Hemoptysis of the mild or streaking type, without demonstrable X-ray findings.
2. Positive sputum without demonstrable cavity.
3. Persistent non-productive cough.

ATELECTASIS:

In massive atelectasis mediastinal shift or elevation of the diaphragm on the affected side will occur, so that the condition is readily seen and bronchial obstruction invariably sought. But there are also small areas of atelectasis without visible mediastinal shift which are produced by occlusion of smaller bronchi. Such small atelectatic areas due to endo-bronchial disease are often found in the apical region of one or the other lung, and it is common practice to misjudge the size of the area involved in these



Fig. 3: 6-4-'38: No. 9040

Fig. 4: 6-30-'38: No. 9040

Fig. 3: Atelectatic area right upper lobe suspected in this patient with primary tuberculosis. Bronchoscoped 6-9-'38 and tuberculoma was found in right upper lobe bronchus.—Fig. 4: Same case as Fig. 3. After removal of tuberculoma, atelectatic area rapidly cleared.

regions. So, even if the signs of atelectasis are inconclusive, such areas should be investigated and the incidence of positive findings is sufficiently high to justify bronchoscopy.

In children with primary tuberculosis, where there is a large area of parenchymal disease, bronchial obstruction is very common. In such cases bronchoscopy should be done to determine if obstruction is due to pressure upon the bronchus by much enlarged mediastinal nodes or due to growth or ulceration within the bronchus. In one of our hospitals, several tuberculomas have been found in this way and with removal and treatment, the airways have been re-established with good results. Bronchoscopy of children is neither difficult nor dangerous and can be done at almost any age.

SUDDEN CONSOLIDATION OF A LOBE UNDER COLLAPSE:

Sudden consolidation of a lobe in a lung partially collapsed with pneumothorax is rather a common experience and it very often means bronchial occlusion. Sometimes this is produced by a clot of blood following hemoptysis, but it can also occur because of bronchial ulceration with some stenosis and it is a direct indication for bronchoscopy. From the X-ray findings alone, it is quite impossible to state the most likely cause. However, we do know that neither pneumothorax nor phrenic paralysis should be produced



Fig. 5: 8-12-'41: No. 11398

Fig. 6: 1-7-'42: No. 11398

Fig. 5: Primary Tuberculosis. Bronchial obstruction suspected. Bronchoscoped 8-21-'41. Obstructive ulcer found in right upper lobe bronchus. Fig. 6: Same case as Fig. 5. After bronchoscopy and treatment of ulcerated area. Upper lobe is again aerated and original parenchymal lesion is now visible.

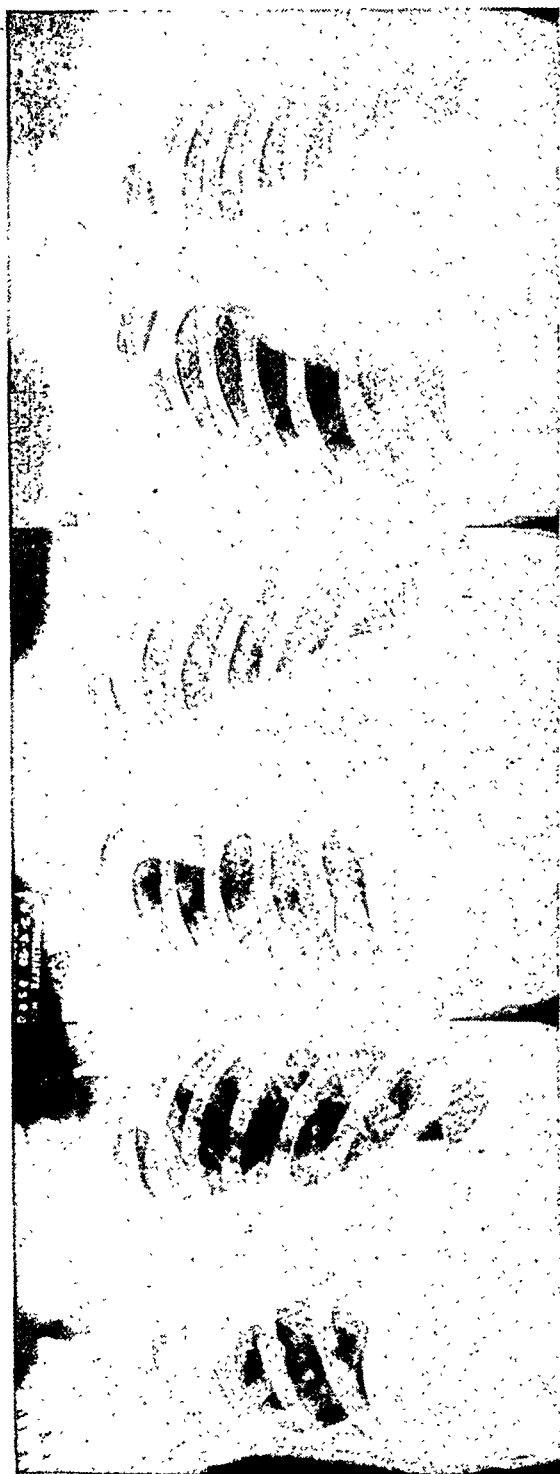


Fig. 7: 8-9-'38: No. 9181

Fig. 8: 3-4-'39: No. 9260

Fig. 9: 3-4-'43: No. 10525

Fig. 7: Failure of phrenic paralysis to effect size of cavity suggested bronchial obstruction. Bronchoscopy revealed extensive ulceration of right main bronchus.—*Fig. 8:* This patient had streaked sputum and no visible source for hemoptysis was found. Bronchoscopy revealed thickened hyperemic mucosa capable of producing streaked sputum.—*Fig. 9:* All cavities closed and sputum became positive. Bronchoscopy revealed diffuse tuberculous ulcerations in right main bronchus.

where there is any marked amount of stenosis of major stem bronchi, and for this reason, we believe that it might in time become necessary as a routine procedure to do bronchoscopy before inducing any appreciable amount of collapse therapy.

SUDDEN SPREAD OF A LESION APPARENTLY CONTROLLED:

In other patients we appear to have gained good control of the disease with pneumothorax or other collapse procedures. Sputum has been converted and remained negative for variable periods, when all of a sudden a spread occurs into other areas, frequently the contra-lateral lung. Such spreads we have often found in cases with endo-bronchial tuberculosis. One can easily imagine that the effect of such ulceration may, like an atomizer, spray most any part of either lung and easily start new foci. It should be considered as one of the signs to be looked for in check-up examinations and when found, bronchoscopy should be done.

BLOCKED CAVITY:

Sudden variations in size of cavities or a cavity with considerable fluid should be regarded as signs of insufficient drainage. In some, there is a ball-valve action, allowing air to enter but not to escape. In the other type, air will enter but there is not sufficient bronchial lumen for all of the cavity contents to escape or be



Fig. 10: 12-19-'36: No. 7696

Fig. 11: 5-14-'37: No. 7696

Fig. 10: Right pneumothorax closed cavity and disease is apparently under control.—Fig. 11: Same case as Fig. 10. New disease developed on the left side. Bronchoscopy revealed ulcer of right main bronchus.

expelled. Sometimes, this may be caused by stenosis as well as kinking of a bronchus, or again, it is caused by endo-bronchial tuberculosis such as a tuberculoma or a severe ulceration which will partly obstruct the bronchus. Failure of cavities to close or reduce in size following collapse measures, which should be adequate, indicates bronchial obstruction.

FAR ADVANCED DISEASE:

Lastly, in the consideration of the direct signs, one should always suspect endo-bronchial tuberculosis in all cases of far advanced tuberculosis, especially in the presence of multiple and bilateral excavations. In such cases, large areas of mucous membrane of the bronchial tree must be constantly exposed to infected, excreted material with resulting breakdown or tubercle formation.

INDIRECT X-RAY SIGNS:

1. Hemoptysis of the Mild or Streaking Type, Without Demonstrable X-Ray Findings:

Hemoptysis is uncommon in the non-ulcerating type of tuberculosis, unless there is an associated bronchiectasis. We also know that mushy and open ulcerative endo-bronchial tuberculosis is capable of eroding small blood vessels and thus cause bleeding. Such bleeding is usually not profuse but often just a slight ooze,



Fig. 12: 3-4-'39: No. 10122

Fig. 13: 3-31-'39: No. 10122

Fig. 12: Pneumothorax on the left with selective collapse of upper lobe and good aeration of lower lobe.—Fig. 13: Same case as Fig. 12. Sudden consolidation of left lower lobe suggested bronchial obstruction. Bronchoscopy revealed ulcer of left main stem bronchus with stenosis.

which will produce streaking of the sputum. When this occurs, it should serve as a reminder that such a condition might exist and be an indication for bronchoscopic investigation.

2. Positive Sputum Without Demonstrable Cavity:

Positive sputum, without demonstrable cavity, is not an uncommon experience of all radiologists. We first of all, look for small cavities in the apical areas where the ribs often get in our way. We next make oblique projections to rule out possible cavities hidden by the heart shadow. Sometimes it is necessary to make films with the patient on the Bucky diaphragm to penetrate a heavy pleura or dense fibrosis. Stereoscopic projections should always be made to decide whether a suspicious shadow is or is not a cavity. Planography is a very useful method for finding cavities, but it is seldom available. In a number of such cases where we failed to find cavities, bronchoscopy was done and endo-bronchial lesions were found, and after treatment of such lesions, sputum converted.

The finding of such lesions in this type of case has given the radiologist much confidence in his accepted standards of what he must see to interpret a cavity and differentiate it from blebs and similar ring-like shadows.

3. Persistent Non-Productive Cough:

Lastly, we find a patient whose cough is out of proportion to that necessary to evacuate any excreted material. It is usually a dry cough and the x-ray findings are minimal. Here one should expect endo-bronchial irritations as a cause for the cough and look for such disease with the bronchoscope.

With these signs, and findings, plus some physical signs, such as a wheeze, we have at one of our institutions examined 565 patients with the bronchoscope in the past five years and in this group, 148 cases of endo-bronchial disease were found. One hundred ninety-eight of these were examined routinely, prior to thoracoplasty and other collapse measures. A few others were examined because of certain peculiarities of distribution of the disease in the lungs, namely, a hilar flare; but this was given up because it yielded a very low incidence of positive findings. We believe that because of this five year experience, we have been able to exclude certain signs and justify others. However, a table of findings and interpreted signs is appended, as well as photographic reductions of typical cases in which endo-bronchial tuberculosis was found.

Bronchoscopic Observations in Tuberculous Tracheobronchitis—Clinical and Pathological Correlation**

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During the past decade tuberculous tracheobronchitis has come to be recognized as one of the most common and most serious complications of pulmonary tuberculosis. Only in recent years has bronchoscopy been accepted as a safe diagnostic procedure in tuberculous patients. During this time it has played the leading role in establishing the high incidence and the true clinical significance of these lesions. Today, as the result of many excellent clinical and pathological studies,^{1,2,3,4,6,7,19,22,23,25} we know that the presence of endobronchial tuberculosis complicates the treatment and makes the prognosis of pulmonary tuberculosis much more serious. It is also an established fact that this complication can occur in any stage of the parenchymal disease. This is substantiated by the fairly high incidence of minimal lesions in almost all reported series. In fact in a few cases no parenchymal lesion has been found by means of x-ray. Because of these observations bronchoscopy has been used in an ever-increasing percentage of cases in recent years. In some institutions routine bronchoscopy is now performed on every patient admitted although the usual procedure is to bronchoscope only those with specific indications.

However, in spite of all the work and publications in the past decade a great many clinicians are still either not aware of the prominent role played by tuberculous bronchitis in determining the prognosis of their cases, or are failing to apply the known facts concerning this complication in outlining the therapy for their tuberculous patients. The bronchoscopist is reminded of this all too often by the large number of patients he examines who have tuberculous bronchitis and are collapse therapy failures with persisting positive sputum, uncontrolled symptoms, empyema, unexpandable lung, atelectasis, and anaerobic infection in the lung. The time has come when this complication must be considered a possibility in every patient with pulmonary tuberculosis. The bronchoscopist must cease to be a pure endoscopist and become a student of the disease process as a whole so that he, along with the clinician and the surgeon, working as a team, may arrive at the

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most intelligent and timely therapeutic approach in each individual case.

INCIDENCE

The incidence of tuberculous tracheobronchitis as revealed by routine bronchoscopic examination of patients on admission to sanatoria falls between 10 and 15 per cent.^{10,21} The work of Salkin, Cadden and Edson is especially interesting in that they found an incidence of 10 per cent at the time the patients were admitted to the sanatorium. During residence, however, an additional 5 per cent of their patients developed tracheobronchial lesions. This emphasizes the need for subsequent bronchoscopic examination in these patients when the clinical and x-ray indications are present. Of course, the incidence in patients referred for bronchoscopy because of specific symptoms, signs or x-ray findings, will be much higher. In this latter group the incidence will fall between 30 and 60 per cent depending upon how carefully they have been selected. In almost all reported series the preponderance of females (75 to 85 per cent) has been outstanding. In my own experience 72 per cent of the bronchial lesions have occurred in females. The work of Salkin, Cadden and Edson is an outstanding exception to this. They report that the sex of the patient is a factor of no importance in determining the incidence of these lesions.

The incidence and significance of tuberculous bronchitis in young children is just coming to light. The excellent work of Jones, Rafferty and Willis has pointed the way in this study. They have shown that 12 per cent of the children admitted to Maybury Sanatorium will present at some time or other the clinical picture of epituberculosis. They have bronchoscoped a number of these children and have found that 75 per cent of them have definite evidence of endobronchial tuberculosis, or bronchial occlusion due to glands. In fact, tuberculoma and erosion of caseous lymph nodes are seen predominantly in children and are rarely seen in adults.

Autopsy studies have revealed that tuberculous lesions of the trachea or major bronchi will occur in about 40 per cent of all cases.^{3,21}

PATHOGENESIS

CORRELATION OF PATHOLOGY AND BRONCHOSCOPIC OBSERVATIONS

During the past year Dr. William Meissner has studied the surgical pathology of 60 tuberculous lungs resected by Dr. Richard H. Overholt. In 31 of these lungs some degree of involvement of the major, lobar, or segmental bronchi has been demonstrated.

As stated before, the explanation of this is unknown, but it may have something to do with the lymphatic drainage in the bronchial wall itself.

Tuberculous tracheitis is rarely an isolated process. As a rule it represents extension of the bronchial lesion into the trachea and thus, in almost every instance, the tracheal lesion will be found on the side of and continuous with the bronchial involvement. The incidence of laryngeal tuberculosis in our cases has not been greater than that which would be anticipated in any group of tuberculous patients. Our experience here is in keeping with that of Samson.²²

CLASSIFICATION

Numerous classifications of tuberculous bronchitis have appeared in the literature and almost without exception they have been based on sound and careful study. As has been pointed out by Salkin, Cadden and Edson, there are so many classifications in the literature that it is difficult to compare the reported series.

In classifying any disease process the pathology and pathogenesis must be considered. With this in mind it is suggested that any classification of tuberculous bronchitis should consider the following points:

1) Type of bronchial lesion.

2) Location and extent of the process.

3) Is there an associated stenosis? If so, the degree and cause should be stated. The answer to these questions will bring forth most of the information needed to determine the actual condition of the bronchus and to decide its influence in the prognosis and treatment of any given case. Regardless of what classification is used, it seems absolutely essential that a good description should accompany every operative note. In our experience this has proved to be much more valuable than any actual classification of the lesion we have yet been able to find. At the present, the following classification and outline is used and it is very similar to many of those reported in the literature.

A Classification of lesion

1 Submucosal

2 Ulcerative

3 Hyperplastic type:

(a) With ulceration

(b) Without ulceration

(c) Tuberculoma

(d) Destruction of cartilage

- 4 Fibrous stenosis
 - (a) With ulceration
 - (b) Without ulceration
- 5 Eroding lymph gland
- B Location and extent of lesion
- C Associated Stenosis (yes, no)
 - 1 Degree of stenosis
 - 2 Cause of stenosis
 - (a) Inflammatory edema
 - (b) Hyperplastic changes
 - (c) Fibrostenosis

I should like to re-emphasize that the various types of bronchial lesions usually coexist. The ulcerohyperplastic type is the most common in patients who have been referred because of definite symptoms, signs, or x-ray findings. When bronchoscopy is done routinely a higher percentage of submucosal lesions will be encountered.

INDICATIONS

The indications for bronchoscopy in tuberculous patients are divided into clinical and roentgenological, and for the sake of clarity are enumerated under these headings. Only those considered to be most common and important are included.

A Clinical Indications:

- 1 Unilateral wheeze
- 2 Positive sputum without evidence of parenchymal source
- 3 Positive sputum with apparently controlled parenchymal disease
- 4 Severe symptoms (cough, difficulty in raising sputum, dyspnea and cyanosis) without evident cause in the parenchyma
- 5 Evidence of intermittent retention of secretions; such as, variation in the amount of sputum and the occurrence of fever
- 6 Prolonged fever following thoracoplasty

B Roentgenological Indications:

- 1 Mediastinal shift with or without elevation of diaphragm
- 2 "Hilar flare"
- 3 Opaque lesions of lobular, lobar, or multilobar distribution (Opaque lesion is used here in preference to the term "atelectasis"). These may appear suddenly following collapse therapy
- 4 Basal tuberculosis
- 5 Certain types of cavity
 - (a) Those with thin walls and fluid levels
 - (b) Those that fluctuate in size

- 6 Widespread parenchymal disease without evident parenchymal source
- 7 Obstructive emphysema.

As can be readily seen, the clinical and x-ray evidence of tuberculous bronchitis is based on the fact that in many of these cases there is narrowing of the bronchus with retention of secretion. A very high incidence of bronchial lesions will be discovered if the above signs and symptoms are used as a guide in selecting the patients. The incidence should be at least 50 per cent. The vast majority of cases referred for bronchoscopy who prove to have endobronchial lesions have more than one of the above signs or symptoms. The most common have been the unilateral wheeze, severity of symptoms, deviation of the mediastinum and elevation of the diaphragm, and the presence of opaque lesions or obstructive emphysema on x-ray. It must be realized that there is a stage in the development of tuberculous bronchitis that precedes the occurrence of these clinical and x-ray signs. Likewise, the bronchoscopist must realize that when the clinical and x-ray evidence is very definite, a negative bronchoscopy does not rule out severe involvement of the bronchial system just beyond his visual field, and re-examination is indicated.

CONTRAINDICATIONS

The following contraindications to bronchoscopy have been respected:

- 1) Terminal phase of disease
- 2) Pulmonary hemorrhage
- 3) Acute respiratory infection
- 4) Tuberculous laryngitis

The first three require no comment. Tuberculous laryngitis of the ulcerative type is considered an absolute contraindication except in case of extreme emergency, such as bronchial occlusion following thoracoplasty. If the laryngeal involvement is of the submucosal and inflammatory type, bronchoscopy is often performed if the patient is cooperative and trauma can be avoided.

TECHNIQUE

Technique is of more importance in bronchoscoping tuberculous patients than any other group referred for this procedure. This applies especially to anesthesia, which should be done very carefully and completely so that the entire bronchoscopic examination can be performed with the complete cooperation of the patient and without trauma. The patient is usually prepared with three

grains of sodium-pentobarbital and one-sixth grain of morphine. The use of scopolamine in tuberculous patients is discouraged because it prevents the patient from cooperating during the operative procedure. The posterior pharynx and the base of the tongue are first anesthetized by spraying lightly with a 10 per cent solution of cocaine-hydrochloride. After a few minutes the pyriform sinuses are sprayed; following this the larynx. The pyriform sinuses are then again cocainized with the use of the cross forceps. Following this the trachea and bronchi are anesthetized with 2 per cent cocaine. In performing this part of the anesthesia the laryngeal mirror is used to secure direct vision of the larynx and the cocaine is dripped between the cords. One cc. is placed into the trachea with the patient sitting upright. The patient is then leaned toward the side in which the lesion is not suspected and 1 cc. of cocaine is dripped into this bronchus. The patient is then leaned toward the involved side where most of the bronchoscopic work is anticipated and 2 cc. of cocaine injected into this side of the bronchial tree. As a rule, if sufficient time is taken to anesthetize the patient, a very small quantity of cocaine is required and anesthesia is usually complete. Occasionally it may be necessary to supplement the anesthesia during the bronchoscopy by spraying cocaine through the bronchoscope. The 7 mm. full-lumen bronchoscope is used and, as a rule, it is introduced without the aid of the laryngoscope. If there is any question about a laryngeal lesion and good visualization has not been secured with the mirror, the larynx is exposed with the laryngoscope. Bronchoscopy is proceeded with very slowly so that the bronchoscope will not be passed over an active lesion. If a tracheal or bronchial lesion is found the bronchoscope is kept proximal to it and treatment is applied with the scope in this position. Thirty per cent silver nitrate is applied directly to the granulation tissue or ulcerated areas. The tracheobronchial tree is aspirated as thoroughly as possible of all its secretion and the bronchoscope is withdrawn very slowly, aspirating all secretion which has collected around the scope. The rapid withdrawal of the bronchoscope in a tuberculous patient is to be condemned, especially in one who has had considerable secretion during the procedure. In these patients considerable secretion is always found in the trachea which has collected around the scope. If this is not removed, it predisposes to spread.

When the patient is returned to bed it must be remembered that his tracheobronchial tree has been completely anesthetized and his cough reflex abolished. During this time he must be protected against spread. This can be accomplished by placing the patient on his affected side for three hours. By this time the anesthesia will have worn off and his protective reflex will again be effective.

Using the above medication and technique, post-bronchoscopic reactions and spreads have almost been eliminated.

THERAPY

The local therapy of tuberculous bronchitis has been a most debatable point. Different authors have had such variable experience that there must be some explanation. For instance, Myerson states: "All of the active lesions in the tracheobronchial tree have the ability to heal in most patients. For this reason local therapy is frequently valueless and at times harmful." On the other hand numerous authors have reported excellent results from local therapy. Scharp and Gorham have reported 95 per cent good results, using 30 per cent silver nitrate; Tuttle, O'Brien, Day and Phillips, 70 per cent healing with silver nitrate; Packard and Davison, improvement in seven of eight cases, with the use of electrocautery; and a recent excellent article by Davies shows that of twenty-six patients treated with silver nitrate, seven were classified as arrested, sixteen improved, two unimproved, and one dead.

Salkin, Cadden and Edson state: "About three-fourths of all cases heal spontaneously if the disease in the parenchyma is controlled." Contrary to this, Alexander, Sommers and Ehler have found in their experience with sixty thoracoplasty patients with tuberculous endobronchitis, that: "Complete control of the parenchymal lesion by adequate collapse is not necessarily followed by anything like a corresponding improvement in the tracheobronchial lesion."

Why this vast difference in experience? Many factors may help to explain it.

1) *Type of Endobronchial Lesion:*

It is generally recognized that the early, submucosal type of tuberculous bronchitis has a much better prognosis than the ulcerohyperplastic and stenotic lesions regardless of therapy. Not only is the submucosal lesion the most benign of those seen in the bronchi, but as a rule it is associated with less extensive parenchymal tuberculosis, and is less apt to cause serious complications to collapse therapy. Once the ulcerohyperplastic or stenotic lesions have developed the prognosis becomes much worse, because it represents an open focus of disease, the pulmonary drainage tract is obstructed, and collapse therapy is rendered increasingly more dangerous. Thus it is evident that general statistics are of little significance. These cases must be broken down according to the type of lesion present in the bronchus. It is to be expected that a series of cases such as that of Salkin, Cadden and Edson with a high percentage (58.7%) of early, non-ulcerating lesions, will

present an entirely different picture from a group such as that published by Tuttle, O'Brien, Day and Phillips, in which 100 per cent of the cases had bronchial stenosis.

2) *Interval between Treatment:*

This may be a significant factor in explaining why some authors have had good results while others have failed in the local treatment of tuberculous bronchitis. The treatments must be sufficiently frequent to accomplish their purpose, which is twofold: (1) to stimulate the indolent tuberculous ulcer; and (2) to burn away granulation tissue so that the epithelium of the mucosa may close in over the ulcerating base. This also reduces that portion of the obstruction due to the presence of the granulation tissue. The experience of many workers has shown that a two or three week interval between treatments is the maximum if consistently good results are to be expected, when using silver nitrate as the cauterizing agent. If these bronchial lesions are treated irregularly, only when the bronchoscopist finds the time, or at infrequent intervals of two to three months, disappointing results are to be expected because this permits the granulation tissue to again build up to cause obstruction, stagnation of secretions, and increased inflammatory reaction.

3) *General Therapy of Patients:*

The general condition of the patient is a very important factor in the control of any tuberculous lesion. Tuberculous bronchitis is no exception. These patients should be at complete bed rest in a sanatorium, with the same diet and hygienic treatment offered a patient with an active parenchymal lesion. This is an extremely important feature, and one of the most neglected in the treatment of cases with bronchial tuberculosis.

4) *Duration of Bronchial Disease:*

As is true with any form of tuberculosis, early diagnosis and treatment offer the best chance of controlling the lesion. Good results cannot be expected if cases are referred for bronchoscopic treatment months, sometimes years, after signs and symptoms of endobronchial disease first appeared. All too often patients with bronchial tuberculosis are referred for bronchoscopy only after their general condition has become extremely poor and the parenchyma of the lung extensively involved. Not infrequently ill-advised collapse therapy has already been instituted and the expected complications (empyema, atelectasis, spread, anaerobic infection) have already occurred. Naturally institutions referring such patients for local therapy of bronchial lesions will have poor

results. Reports coming from such institutions must be analyzed carefully in evaluating these results. It is unreasonable to condemn any therapeutic measure in the treatment of any kind of tuberculosis when it is being applied, in the majority of instances, to far-advanced disease. We must come to look upon tuberculous bronchitis as we have the parenchymal lesion. The diagnosis must be made as soon as possible and therapy given immediately if the best results are to be anticipated.

5) *The Control of the Parenchymal Lesion:*

The control of the parenchymal lesion undoubtedly has a favorable influence upon the bronchial lesion in many instances. This is especially true if it is the source of a large amount of secretion which causes bronchial irritation. All bronchoscopists are familiar with the marked improvement in the bronchial lesion occasionally seen when a large cavity or a tuberculous empyema with a bronchopleural fistula has been drained. However, as has been pointed out before, control of the parenchymal lesion is not necessarily followed by corresponding improvement of the tuberculous bronchitis. Also, control of the parenchymal disease is not easily accomplished because of the presence of bronchial disease.

Thus, it is evident that many factors enter into the success or failure of the local treatment of tuberculous bronchitis. It also seems clear that treatment of the bronchial lesion is only one phase of the therapy of the tuberculous patient with this complication. It must be supplemented by rest and by the indicated procedure to control the associated parenchymal disease.

The following is a summary of the general concept we employ in treating these cases:

1) Local therapy with 30 per cent silver nitrate is used at intervals of two weeks. Treatment is instituted as early as possible. The rationale for this therapy has previously been stated. We have never seen stenosis result from the use of 30 per cent silver nitrate, and agree with many authors that any resultant fibrosis in the bronchus is the end result of the destruction of the bronchial structures by the tuberculous process itself. Usually the stenosis can be predicted when an extensive ulcerohyperplastic lesion is seen.

2) Local therapy is applied only to the areas of ulceration and granulation tissue. By removing the granulation tissue the patency of the bronchus is often increased.

3) No attempt is made to treat the fibrous stenoses. We know of no method which will effect any permanent dilatation of these lesions. Any associated ulceration or granulation tissue is cauterized. Dilatation and aspiration of retained secretions is at times

indicated for temporary relief of symptoms. Other than this, bronchoscopic treatment has no place in the treatment of these lesions. Supplemental treatment with complete thoracoplasty or pneumonectomy is advised.

4) Biopsy is never performed because of the danger of creating ulceration.

5) With lesions that are responding well, treatments are continued at two week intervals until all evidence of activity has disappeared. Following this the interval between treatments is gradually lengthened, but repeated examinations are performed for at least six months to determine any recurrence early. Following this, reinspection is advised at four to six month intervals unless symptoms of bronchial disease should recur. In this event bronchoscopy is immediately performed.

6) If improvement does not take place within a reasonable time, or if any of the complications are imminent, pulmonary resection is usually advised in our clinic. At times complete thoracoplasty is performed, with continuation of local therapy to the bronchial lesion. In all instances an attempt is made to apply therapy to the parenchymal lesion before any atelectasis, extensive spread, supuration, or anaerobic infection has taken place. It is the duty of the bronchoscopist to avoid procrastination in treating the bronchial lesion and to advise other therapy before any of the complications have occurred.

This outline of therapy has been followed with the realization that only a portion of the bronchial disease can be treated through the bronchoscope. In almost all cases the bronchial involvement extends to the parenchymal focus. However, we believe that by improving the condition of the major bronchi, better drainage of the small bronchi is effected.

Many authors question the value of local therapy of tuberculous bronchitis with silver nitrate or any other agent. Some maintain that it may cause actual harm and produce increased stenosis. As stated before, we have never seen 30 per cent silver nitrate cause stenosis. On the contrary, we have been convinced that it stimulates healing in the early active stages and, thus, prevents excessive tissue destruction and reduces the possibility of stenosis. In our experience it has given gratifying results in lesions which could be considered at all suitable for treatment. Davies has summarized the evidence in the literature, showing that cases treated locally had much better results than those which had no form of local therapy. His statistics show that, of those receiving treatments, 39 per cent were "arrested, healed or well, and 13 per cent dead;" of those who had no local therapy, only 11 per cent were classified as "arrested, healed or well, and 26 per cent dead." As

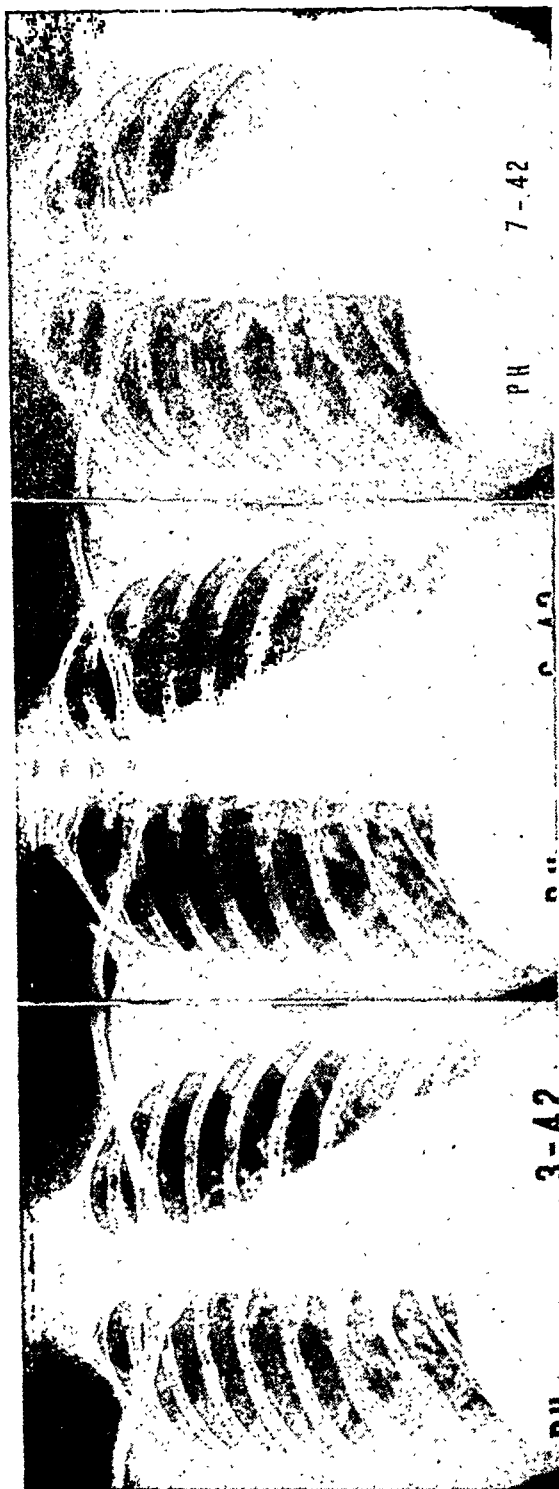


FIGURE 1a: MRS. P. H.

A 29 year old female. Duration of symptoms, three months. *Left:* Roentgenogram of chest in March 1942. Her chief complaints at this time were fatigue, low grade fever, and wheezing on left side of chest. Roentgenogram revealed minimal infiltration in left second interspace and some haziness at the left base. Note slight mediastinal shift to the left.—*Middle:* Roentgenogram of June 1942 showing little if any change.—*Right:* Roentgenogram of July 1942. Note the marked opacity that has developed suddenly at left base with increased shift of the mediastinum. This opacity was interpreted as atelectasis by the radiologist. Bronchoscopy at this time revealed an extensive ulcerostenosis of the left main bronchus just above the level of the upper lobe orifice. Pneumonectomy was performed within 8 weeks of the time the opacity developed.

he states, "there is less than one chance in two thousand that such a difference in results could be due to chance alone⁶."

It is hoped that this discussion has established a concept that the therapy of a patient with tuberculous bronchitis is very complicated and requires the complete cooperation of physician, surgeon and bronchoscopist to arrive at the most rational and effective program of treatment.



FIGURE 1b

This is the surgical specimen of the patient whose x-rays are shown in Figure 1a. The cut surface of the lung shows numerous caseous nodules. Numerous cuts through the lower lobe revealed the same appearance. The entire lower lobe was literally riddled with caseous nodules averaging 0.5 cm. in diameter. There was no cavity. The fundamental pathology here was not atelectasis but caseous tuberculosis. The opacity was caused by the superimposition of the numerous nodules in the lower lobe.

Comment: This case illustrates the densely opaque lung developing distal to an ulcerostenosis. Impaired drainage and the "backfiring mechanism" are suggested as the pathogenetic factors. These opacities pathologically are not atelectasis but extensive tuberculosis. In my opinion we should stop calling this type of x-ray shadow an atelectasis since the term gives us a false impression of what we are treating. This case is living and well today and has a consistently negative sputum.

PATHOLOGICAL PHYSIOLOGY AS SEEN THROUGH THE BRONCHOSCOPE

Two factors of extreme importance in determining the parenchymal pathology and the abnormal physiology of these cases can readily be seen through the bronchoscope. These are obstruction and stagnation of secretions. Even in the early lesion where no significant degree of stenosis is present, stagnation of secretions is quite evident by the tenacious secretions so often seen clinging to the walls of the bronchus. This is due to the loss of ciliary action and the decreased motion of the bronchial wall. Once stenosis has developed the role of mechanical obstruction comes into play. The stagnation of secretions is quite evident at this stage. At times that portion of the bronchus above the stenosis will be filled with purulent secretions up to the level of the carina and will have to be aspirated at the time of bronchoscopy in order to visualize the stenotic area at all. When the obstruction is only partial, more air can pass through the involved area on inspiration than on expiration due to the normal physiological dilatation of the bronchus during inspiration and contraction during expiration. This mechanism develops back pressure in the lung and is the cause of obstructive emphysema, tension cavities, and the failure of cavity closure with apparently adequate collapse. It also explains the occurrence of unexplained dyspnea and cyanosis because this blocked air has a low oxygen content and the circulating blood to this portion of the lung is returned to the general circulation poorly oxygenated. Partial obstruction may become more complete due to the presence of secretions, granulation tissue, or inflammatory edema. When this occurs atelectasis may develop beyond the obstruction.

We have been impressed in the study of resected lungs and in the review of serial x-rays by the occurrence, distal to the stenosis, of extensive nodular lesions, eventually being represented by a densely opaque segment of lung, and the frequent occurrence of small nodular spreads in the contralateral lung. The bronchoscopist can actually see the pathogenetic factor in the development of these lesions if he has the patient cough while the stenotic area is in view. The secretions from the distal portion of the bronchial tree will be seen hitting the stenosis and "backfiring" into the peripheral portions of the bronchial tree. However, an "atomizer" effect is evident on the proximal side of the stenosis where secretions are splattered into this portion of the tracheobronchial tree. Naturally, when the patient takes his next breath, the greatest draught of air enters his good lung and the aspiration of this finally dispersed droplet infection is undoubtedly the cause of

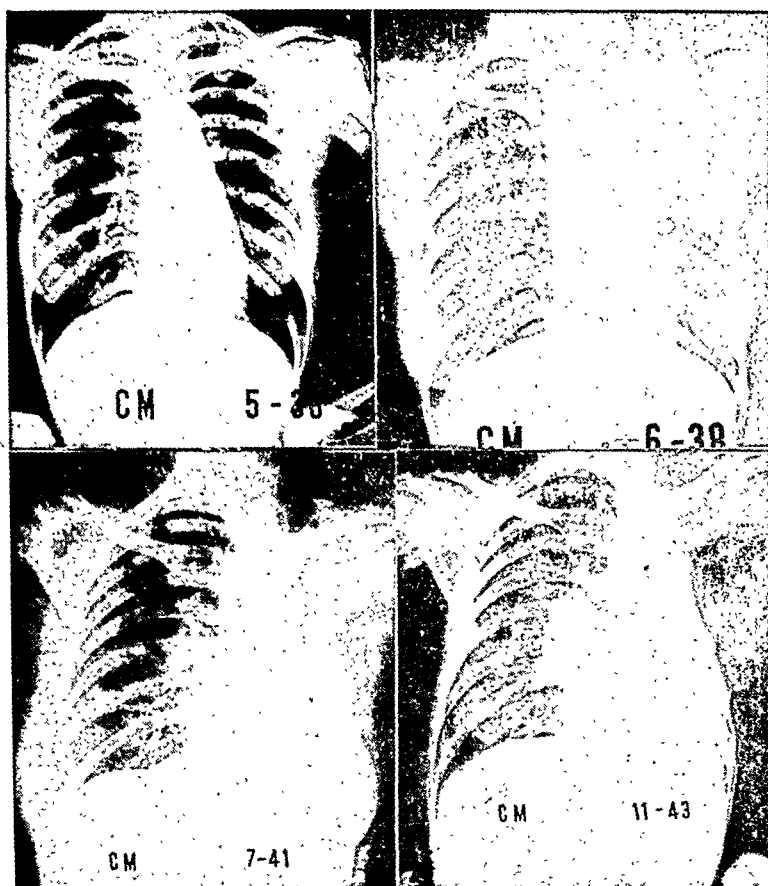


FIGURE 2: MISS C. M.

Age 41. Duration of illness, three years, eight months. *Upper left:* Roentgenogram of chest in May 1936 showing bilateral apical tuberculosis. *Upper right:* Roentgenogram of chest in June 1938 when the patient was admitted to the sanatorium for the second time. The lesion in the right apex has improved, but note the diffuse haziness involving the left upper lobe associated with mediastinal retraction. *Lower left:* Roentgenogram of chest two years following thoracoplasty showing the diffuse opacity of the entire left lung; very little change in the right lung. *Lower right:* Roentgenogram of chest of November 1943 at which time the patient was admitted to the sanatorium for the third time. Note the widely distributed fine nodular spread in the right lung. Also, the absence of any marked localized infiltration in any area of the right lung. The left lung has remained opaque.

Comment: This patient had been negative for eight months prior to the last readmission and had been clinically well for three years; when readmitted she was very sick. Bronchoscopy revealed a fibrous stenosis of the left main bronchus at its orifice. A large amount of pus was coming from the left lung through the stenosis. This case illustrates the development of the opaque lung behind the bronchial stenosis of the left main bronchus, and beautifully illustrates the "atomizer effect" in the contralateral lung. The "backfiring mechanism" is suggested as the cause of the diffuse involvement of the left lung and the "atomizer mechanism" as the cause of the diffuse nodular spread of the right lung.

the fine nodular lesions so frequently seen in the contralateral lung. We have chosen to call these the "backfiring" and the "atomizer" mechanisms. As time passes these become less evident because of the fact that as secretions become more purulent and profuse the entire bronchial tree behind the stenosis becomes literally filled with secretions and the parenchyma riddled with tuberculosis. These secretions tend to prevent the entrance of air and cause increased blockage to the many radicles of the bronchial tree. Anaerobic infection may become superimposed and cause the secretions to have a foul odor. At this stage the x-ray, almost without exception, will present a dense opacity involving the entire parenchyma beyond the point of occlusion in the bronchus. Retraction of the mediastinum and elevation of the diaphragm are frequently associated findings. These x-ray densities are commonly called atelectasis, but, except in rare instances early in their development or when the occlusion is temporary, they represent a parenchyma markedly involved with caseous tuberculosis, not merely airless lung tissue. For this reason the term opaque lung is applied to this type of x-ray shadow in preference to atelectasis. This conception explains the pathological finding that the most extensive parenchymal involvement is almost always distal to the bronchial obstruction, regardless of the original location of the disease. It also explains the high incidence of predominantly basal disease and extensive, scattered parenchymal lesions so frequently seen without cavitation as a source.

THE ROLE OF BRONCHOSCOPY IN DETERMINING THE TREATMENT OF THE PARENCHYMAL LESION

The experience and statistical studies of many authors have proved that collapse therapy may be not only ineffectual in the face of a bronchial lesion, but actually dangerous and may render the prognosis much more serious. It has also been shown that the type of tuberculous bronchitis present is of the utmost importance. The complications encountered in these patients during any collapse therapy program will be directly proportional to two factors: (1) the acuteness and extent of the bronchial involvement, and (2) the degree of stenosis present. The reason for this is that all collapse procedures cause relaxation and shortening of the bronchi and, as a result, are apt to increase the existing stenosis and further interfere with bronchial drainage. Pneumothorax is the greatest and thoracoplasty the least offender in this respect. A 50 per cent incidence of atelectasis has also been reported following phrenic paralysis in patients with stenotic lesions (25). Thus it seems to be quite evident that a careful evaluation of the bronchi should be a prerequisite to the institution of any collapse therapy. Many

clinicians and institutions now routinely bronchoscope all patients prior to thoracoplasty, and yet they fail to evaluate the condition of the bronchi prior to the more dangerous procedure of pneumothorax. It seems difficult to explain this inconsistency since the experience of so many has shown the disastrous result of pneumothorax in these cases.^{4,19,25} Ideally every patient who is to be a candidate for collapse therapy should be bronchoscoped. If this is impossible those with tuberculous bronchitis should be weeded out as much as possible by careful history, physical examination and x-ray studies. When the indications are present bronchoscopy should be performed. Such a program will discover most of the cases with obstructive bronchial lesions. Approximately 50 per cent positive bronchoscopic findings should result. This seems to be a more fruitful program than the routine bronchoscopic examination of only one portion of the collapse therapy patients, such as the pre-thoracoplasty patients, where only 10 to 15 per cent of the bronchoscopic examinations will reveal tuberculous bronchitis. It would seem obligatory to bronchoscope every patient in whom a bilateral collapse program is anticipated. This should be done regardless of the clinical evidence for or against the presence of bronchial disease.

The role of the bronchoscopist is to determine the type of bronchial disease present and, as far as possible, to evaluate its future course. If it is the type which will respond readily to local therapy and the airway is patent, bed rest or possibly pneumothorax may be indicated to control the parenchymal lesion. However, if stenosis is already present, complete thoracoplasty or resection should be advised before extensive parenchymal disease with superimposed anaerobic infection and the resultant poor condition of the patient develop. Pneumothorax and phrenic paralysis are contraindicated in such cases.

SUMMARY AND CONCLUSIONS

1) Tuberculous bronchitis is a frequent and serious complication of pulmonary tuberculosis. It occurs in 10 to 15 percent of all patients admitted to sanatoria.

2) The study of surgical pathology indicates that the earliest bronchial lesions are submucosal in type. The second stage is represented by hyperplastic changes and ulceration, and the third stage by healing. In the third stage a fibrous stenosis may result. The predilection for stenotic lesions to involve the left main bronchus and the right upper lobe bronchus has been suggested.

3) The indications for bronchoscopy in tuberculous patients have been outlined. If these are followed in selecting patients, about 50 percent of the bronchoscopies will reveal endobronchial disease.

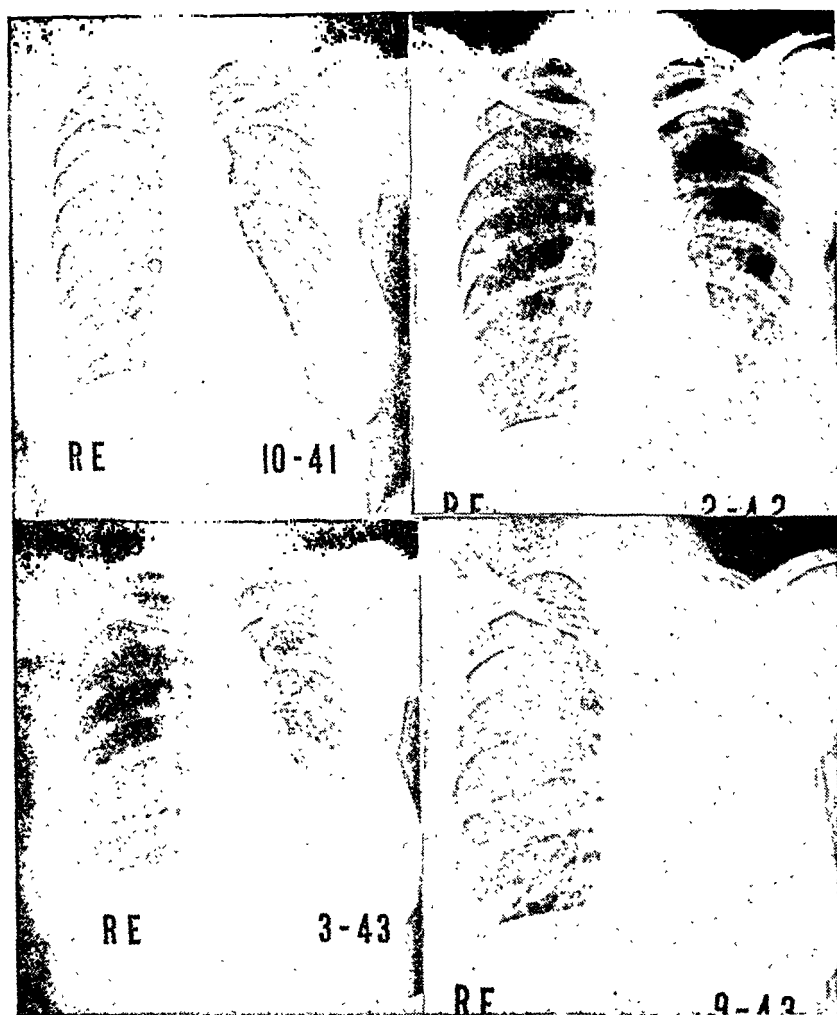


FIGURE 3: MRS. R. E.

Age 50. Duration of illness, eight years. *Upper left*: Roentgenogram of chest in October 1941 showing involvement in the left apex and scattered nodules throughout the remainder of the left lung. No definite cavity was visible to explain the source of this widespread disease. Patient was wheezing, and bronchoscopy revealed an ulcerostenosis of the left main bronchus. *Upper right*: Roentgenogram of February 1942 which shows very little change in the apical lesion on the left side but shows extension of disease at the base. A new area of infiltration is also seen at the level of the anterior third rib on the right side. Two months prior to this time extensive thoracoplasty or left pneumonectomy had been advised on this patient and refused. This advice was given because of anticipated spread which was bound to occur behind the stenosis.—*Lower left*: Roentgenogram of March 1943 showing beginning retraction of the mediastinum and extensive spread of the tuberculosis in the left lung, especially at the base. Numerous fine nodules have begun to appear in the right lung, especially in the mid zone.—*Lower right*: Roentgenogram of September 1943 showing the diffuse opacity of the left lung and extensive nodular spread throughout the right lung, especially at the base where many of the nodules are beginning to become confluent.

Comment: This case again illustrates the opaque lung developing behind

All patients presenting these indications should be bronchoscoped.

4) The existence of the preclinical phase of tuberculous bronchitis is emphasized. This can be diagnosed only by bronchoscopy performed routinely.

5) When clinical and x-ray evidence of tuberculous bronchitis is present, a negative bronchoscopy does not rule out involvement of the branch bronchi and repetition of the examination is indicated at a future date.

6) The importance of technique in performing bronchoscopy in tuberculous patients is emphasized. The following safeguards are indicated: (1) careful and complete anesthesia; (2) the avoidance of trauma to any bronchial lesions during the procedure; (3) the careful aspiration of all secretions in the tracheobronchial tree during the bronchoscopy and just before the bronchoscope is withdrawn. It is important to withdraw the bronchoscope slowly so that all tracheal secretions which have collected around the scope will be aspirated. (4) Place the patient on his affected side for three hours after returning him to his bed. This is done to protect him against spilling secretions to his good lung during a period when his cough reflexes have been abolished by the anesthesia.

7) The pathological physiology as seen through the bronchoscope is discussed and the importance of the bronchial lesion in determining the type of parenchymal lesion is presented. The stagnation and "backfiring" of secretions are described as the pathogenetic factors in producing the opaque lesions, basal tuberculosis, "hilar flares," and disseminated infiltration so commonly seen in the ipsilateral lung. An "atomizer" effect is described as the cause of the nodular spreads frequently seen in the contralateral lung.

8) Local therapy of the endobronchial lesion with 30 percent silver nitrate has been found to be effective in lesions considered to be suitable for treatment. These are the ulcerative and ulcerohyperplastic types. This represents only one phase of the treatment of these patients. Their general condition and the therapy of the parenchymal lesion are factors of extreme importance, neither of which should be neglected.

9) The presence of a marked fibrous stenosis contraindicates local therapy except for the cauterization of any associated ulceration or granulation tissue. Complete thoracoplasty or pneumonectomy is indicated in such cases. In my opinion, dilatation as a form of treatment does more harm than good and leads to

the stenosis and the fine nodular spread that occurs eventually in the contralateral lung. It also illustrates that complications of bronchial disease must be anticipated in the treatment of patients with this complication.

procrastination in applying surgery. It is indicated only to alleviate distressing symptoms, either as a temporary measure or in the hopeless case.

10) An evaluation of the bronchial system is as important as that of the parenchyma. Without it an intelligent approach to a therapeutic program is impossible. No patient with any of the symptoms, signs, or roentgenological evidence of tuberculous bronchitis should be given any type of collapse therapy without preliminary bronchoscopy.

11) The type of collapse therapy to be used in controlling the parenchymal lesion is governed by two factors: (1) the type of parenchymal disease; and (2) the type of endobronchial lesion present. The bronchoscopic findings should be considered prior to instituting collapse therapy, especially pneumothorax, in order to avoid serious complications.

12) In the light of present knowledge it would seem ideal to bronchoscope every patient on admission to the sanatorium. However, this seems to be impossible in most institutions and for this reason careful selection of patients by history, physical examination and review of x-ray findings is advised in preference to selecting any one group of patients, such as the pre-thoracoplasty patients, for examination.

13) The concept is presented that we are treating a patient with pulmonary tuberculosis with tuberculous bronchitis as a complication, not treating tuberculous endobronchial disease as an isolated pathological process. This demands consideration of the patient's general condition, the parenchymal disease, and the type of endobronchial lesion. It also requires the complete cooperation of the clinician, surgeon and bronchoscopist to arrive at the most effective program in the treatment of each individual case.

Resumen y Conclusiones

1) La bronquitis tuberculosa es una complicación frecuente y grave de la tuberculosis pulmonar, que sobreviene en del 10 al 15 por ciento de los pacientes admitidos en sanatorios.

2) El estudio de la patología quirúrgica indica que las lesiones bronquiales más tempranas son de tipo submucoso. El segundo período está representado por alteraciones hiperplásticas y ulceración; y el tercer período, por cicatrización. Puede resultar una estenosis fibrosa en el tercer período. Se ha sugerido que las lesiones estenosantes manifiestan predilección por el bronquio principal izquierdo y el bronquio del lóbulo superior derecho.

3) Se ha bosquejado las indicaciones para la broncoscopia en pacientes tuberculosos. Si se siguen estas indicaciones en la selección de pacientes, un 50 por ciento de las broncoscopias revelarán

lesiones endobronquiales. Todos los pacientes que presenten estas indicaciones deben ser broncoscopiados.

4) Se hace hincapié sobre la existencia de la fase preclínica de la bronquitis tuberculosa, la que sólo puede ser diagnosticada mediante la broncoscopia llevada a cabo sistemáticamente.

5) Cuando existen signos clínicos o radiológicos de bronquitis tuberculosa, una sola broncoscopia negativa no elimina la posibilidad de lesiones en las ramas bronquiales menores, y debe repetirse el examen en una fecha futura.

6) Se recalca la importancia de la técnica en la ejecución de la broncoscopia en pacientes tuberculosos. Se indican las precauciones siguientes: (1) *Anestesia completa y cuidadosa.* (2) *Evitar el traumatismo de cualquiera lesión bronquial durante el procedimiento.* (3) *Aspirar cuidadosamente todas las secreciones en el árbol tráqueo-bronquial durante la broncoscopia e inmediatamente antes de sacar el broncoscopio.* Es importante sacar el broncoscopio despacio para poder aspirar todas las secreciones en la tráquea que se han acumulado alrededor del instrumento. (4) *Acostar al paciente sobre el lado enfermo por tres horas después de regresar a la cama.* Se hace ésto para evitar el derrame de secreciones a su pulmón sano durante el período en el cual los reflejos de la tos se hayan suprimidos por la anestesia.

7) Se discute la fisiología patológica que se observa a través del broncoscopio y se expone la importancia de la lesión bronquial en determinar el tipo de la lesión parenquimatosa. Se opina que el estancamiento y el flujo inverso de las secreciones son los factores patógenos en la producción de las lesiones opacas, la tuberculosis basal, las propagaciones hiliares y la infiltración diseminada que tan comúnmente se observan en el pulmón del mismo lado. Se describe un efecto de "pulverizador" que se opina que es la causa de las propagaciones nodulares que frecuentemente se observan en el pulmón del lado opuesto.

8) Se ha encontrado que el tratamiento local de la lesión endobronquial con 30 por ciento de nitrato de plata, es eficaz en lesiones que se consideran susceptibles para tratamiento. Estas son las de los tipos ulcerante y úlcero-hiperplástico. Este es sólo una fase del tratamiento de estos pacientes; su estado general y el tratamiento de la lesión del parénquima son factores de extrema importancia que no deben ser descuidados.

9) La presencia de una estenosis fibrosa marcada, contraindica la terapia local, con la excepción del cauterio de cualquiera ulceración o tejido de granulación concomitantes. En estos casos está indicada la toracoplastia total o la neumonectomía. En mi opinión, el empleo de la dilatación como tratamiento causa más daño que bien y conduce a la tardanza en la aplicación de la cirugía. La

dilatación está indicada solamente para el alivio de síntomas desesperantes, ya como medida provisional o en caso desahuciado.

10) Es tan importante evaluar el sistema bronquial como el del parénquima. Sin ello no se puede establecer inteligentemente una terapéutica adecuada. Ningún paciente que presente cualquiera de los síntomas o signos físicos o roentgenológicos de bronquitis tuberculosa debe recibir la colapsoterapia en ninguna forma sin una broncoscopia preliminar.

11) El tipo de colapsoterapia que debe emplearse para controlar la lesión parenquimatosa está gobernado por dos factores: (1) el tipo de la lesión parenquimatosa; y (2) el tipo de la lesión endobronquial existente. Se debe tener en cuenta las evidencias broncoscópicas antes de iniciar la colapsoterapia, especialmente el neumotórax, a fin de evitar complicaciones graves.

12) A la luz de lo que se sabe actualmente, parecería ser ideal el que se broncoscopiara a todo paciente a su ingreso al sanatorio. Empero, ésto parece ser imposible en la mayor parte de las instituciones, y por esta razón se recomienda la selección cuidadosa de los pacientes mediante la historia, el examen físico y la revista de los hallazgos radiológicos, en preferencia al seleccionar para el examen algún grupo de pacientes, tal como los que van a ser toracoplastizados.

13) Se presenta el concepto de que estamos tratando a un paciente con tuberculosis pulmonar que tiene bronquitis tuberculosa como complicación, y no tratando la lesión endobronquial tuberculosa como si fuera un proceso patológico aislado. Esto demanda el estudio del estado general del paciente, de la lesión parenquimatosa y del tipo de la lesión endobronquial, y también requiere la completa cooperación del clínico, el cirujano y el broncoscopista, a fin de establecer la terapéutica más eficaz en cada caso individual.

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Clinical Aspects of Endobronchial Tuberculosis*

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During the past two decades, many important advances have been made in the pathological, clinical, and roentgenological aspects of pulmonary tuberculosis. Although the literature is replete with many studies of this disease, the subject of endobronchial tuberculosis appears to have received scant attention. It was not until 1931, when Eloesser¹ called attention to the pathological changes and complications resulting from endobronchial tuberculosis, that it was recognized as a major problem. Then it was again neglected, and only in the past four or five years, has the entire problem of endobronchial disease with its far-reaching sequelae received the attention it deserves.

The reasons for this neglect are many. One can always blame the war and the resulting withdrawal of medical personnel from our sanatoria. The lack of well organized research departments in our sanatoria is appreciated by all who have been associated with state or county hospitals. The chief deficiency according to Lloyd and Buddetti² lies in the fact that in most places bronchoscopy remains fettered to the nose and throat department. I concur that the laryngologist usually has only a passing interest in the various manifestations of bronchial disease. Also many sanatoria are situated at a distance from medical centers, and the services of a trained bronchoscopist are either difficult to obtain or entirely out of reach. They are also correct when they state that the lung specialist can never consider himself adequately trained until he has mastered the art of bronchoscopy. Furthermore, bronchoscopy will never render its maximum service to medicine until it is embraced by the man to whom it rightfully belongs—the specialist in chest diseases. A new orientation as to who should bronchoscope the tuberculous patients is certainly desirable and should receive full discussion. May I also add that the unpleasant and frequently distressing reaction by the patient to inexperienced bronchoscopy has also probably been a deterrent factor in the frequency of this examination.

A thorough knowledge of the relationship of the underlying pathology of endobronchial tuberculosis to the altered dynamics of pulmonary function is a prerequisite to the intelligent understanding of the various clinical manifestations of this disease. Many

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students of lung pathology have directed our attention to the importance of bronchial occlusion as a major factor in pulmonary suppuration. Cutler and Schlueter³ have emphasized the interrelationship of endobronchial trauma to lung abscess, while Fleischner⁴ has repeatedly pointed to bronchial occlusion as the chief cause in the development of pulmonary disease. As with suppuration elsewhere in the body, successful healing depends upon adequate drainage. As long as bronchial drainage is interrupted or is inadequate, so long will the infection entrapped in the lobe continue to progress. A patent, physiologically adequate bronchus is essential for the normal function of lung tissue.

PATHOLOGICAL PHYSIOLOGY

Any interference with the normal flow of air to and from the lobe will produce static as well as dynamic changes in the lungs. Whether the pathological changes consist of diffuse edema or fibrous stenosis, the resultant decrease in the size of the lumen will greatly affect the passage of air. If the obstruction is nearly complete, the lobe will either shrink or become markedly distended. If the former occurs and infection is trapped, suppuration results. On the other hand, if a check-valve effect is present, localized emphysema develops. This may take place either in a whole lobe or part of a lobe. In cases where parenchymatous destruction or cavitation exists, variations in the size of the cavity will occur.

Clinically, this phenomenon is greatly exaggerated in the course of artificial pneumothorax therapy. In such cases, there is either a shrinkage of the involved lobe or lobes giving an opaque appearance to the lung or marked emphysema causing rapid loss of the pneumothorax space. The same holds true in thoracoplasty cases where cavities will not close in spite of the seemingly adequate collapse or where suppurative changes may ensue as a result of a blocked bronchus. It is thus quite evident that in order to insure good result in collapse therapy, be it pneumothorax or thoracoplasty, due consideration must be given to the presence or absence of endobronchial disease. To collapse a lung, even by artificial pneumothorax, without due regard for the integrity of the bronchial tree, is to invite many complications. The lung may fail to re-expand and the collapse may remain irreversible even after a short period of such treatment.

INCIDENCE

The incidence of endobronchial tuberculosis will obviously vary with the zeal as well as with the skill of the operator. Until routine endoscopic examinations are made on all sanatorium patients at periodic intervals, the true incidence of this complication will

not be definitely known. In most institutions, at the present time, patients are bronchoscoped only when there are suggestive signs and symptoms. At the Norfolk County Sanatorium in Massachusetts, 50 per cent of all patients bronchoscoped because of suspicious symptoms showed tuberculosis of the bronchi. So far, the best figures are those of Salkin, Cadden and Edson⁵ and their figure of 15 per cent must stand. The post-mortem figures of Auerbach, Silverman and others are naturally much higher, the incidence being as high as 70 or 80 per cent. A perusal of the literature places the incidence somewhere between 5 and 15 per cent.

CLINICAL FEATURES

The diagnosis of endobronchial tuberculosis can only be made definitely when it can be visualized by the bronchoscopist. Disease of the small bronchi may escape detection. In fact, only a small part of the larger bronchi come under the direct eye of the observer. Hence routine examinations of all sanatorium patients will fail to disclose peripheral lesions and thus mislead both the physician and the patient. Clinically, however, we are mainly concerned when the larger bronchi are stenosed. Obstruction of the peripheral bronchi results in atelectasis of small segments of lung tissue and may have no clinical significance.

The following study is based upon an analysis of 50 proven cases of tuberculous bronchitis. All of the patients were bronchoscoped by Dr. Richard H. Overholt or his associates. Although the number is small, I feel that 50 cases of proven bronchial disease is sufficiently large to throw some light on the various manifestations of this disorder. In this series, the predominance of females is noteworthy since they constituted 72 per cent (36) and the males only 28 per cent (14). The women were also of a slightly younger age, average being 36 years, while that of the males was 41 years.

The chief symptoms in this group were a *localized* wheeze or loud auscultatory rhonchi. These were present in 62 per cent of the cases. Indeed it was the localized wheeze that mainly aroused the suspicion as to the existence of this complication. In the case of two young women, no definite parenchymatous disease could be established roentgenologically. Because the wheezing was localized, endobronchial disease was anticipated. Subsequently, bronchoscopic as well as bacteriological examination confirmed our suspicion. While localized wheezing may be due to any bronchial obstruction, such as mucous plugs, distortion of the bronchi by scars or outside enlarged mediastinal glands or tumors, I feel that the burden of proof in all cases of localized wheezing occurring in the course of pulmonary tuberculosis is that it is not tuberculous in nature. The admonition that everything that wheezes is not

necessarily asthma certainly holds good in pulmonary tuberculosis.

Next to wheezing and rhonchi, our attention to this disease in the cases of artificial pneumothorax was directed by the so-called completely 100 per cent collapsed lung or the "opaque" unexpandable lung. I refer to it as "opaque" lung rather than atelectatic as infection may dominate the picture in these lungs rather than mere lack of aeration. Twenty patients of this group fell into this category. Nine of these patients had a complete collapse, as no lung could be visualized. Attempted re-expansion resulted in mediastinal distortion with marked displacement of heart and mediastinum. While the wheezing disappeared when the lung was completely collapsed, any attempt to re-expand the lung caused a return of this symptom. Pneumothorax therapy in the case of one young man caused marked ballooning of the cavity to giant proportions. Variations in the size of the cavity with the increase or decrease of intrapleural pressure was noted in two cases. Pneumothorax therapy in one patient brought out the evidence of cavitation which was not clear prior to this treatment. The same thing holds true in cases of thoracoplasty, where failure to close cavities or convert sputum, persistence of cough, copious expectoration, hemoptysis as well as evidence of pulmonary sepsis is due to endobronchial disease.

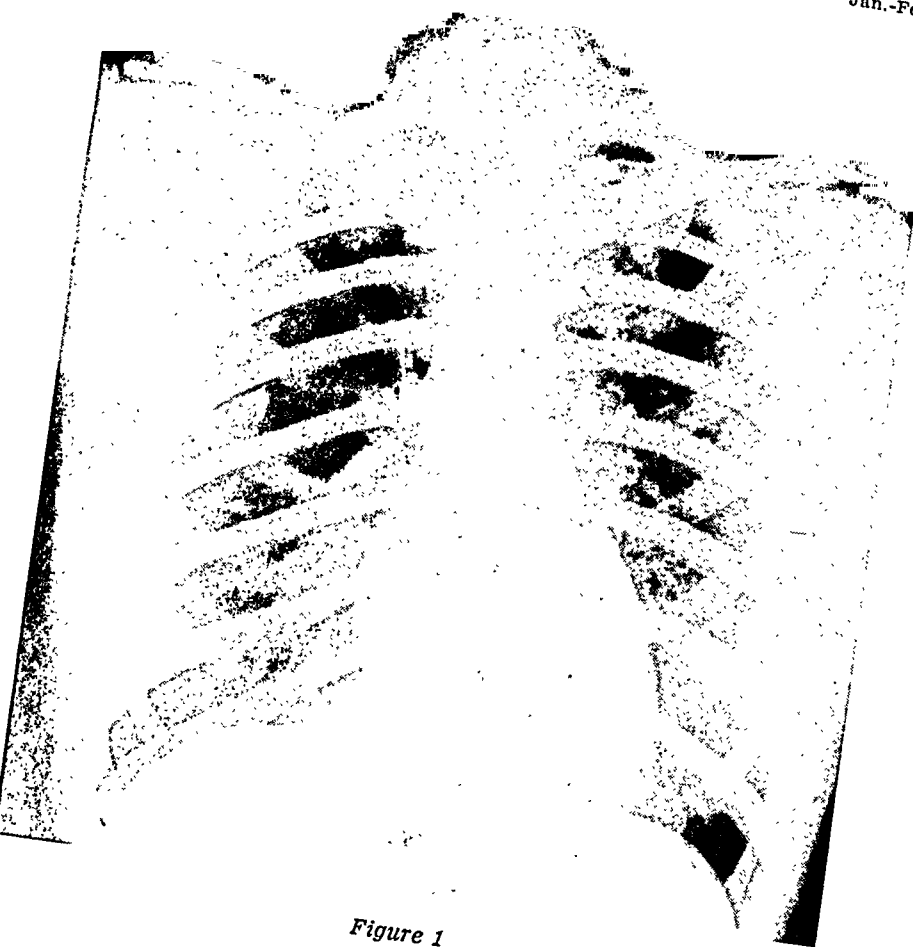
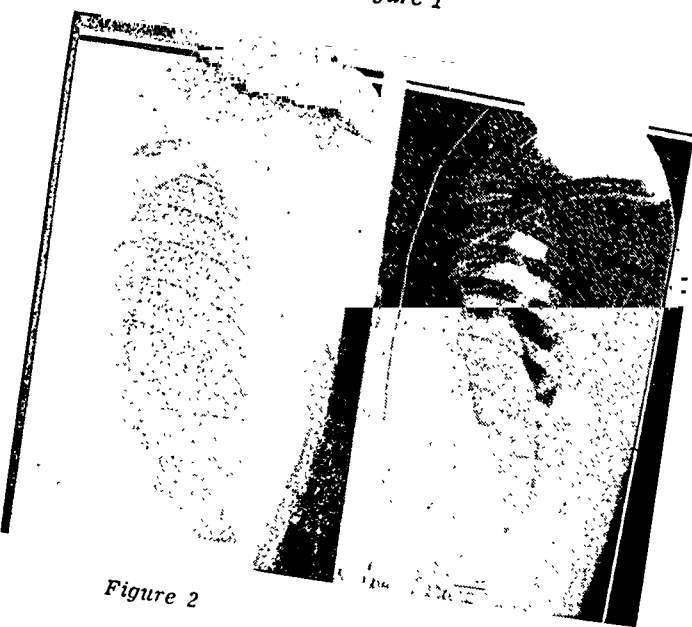
An interesting symptom in endobronchial tuberculosis is pain, or sometimes mild soreness, in the sternal region. This was encountered in 15 patients. The pain was not severe. Usually, it was described by the patients as an annoying itch or smothering sensation in the lower sternal region. This symptom is probably due to infection of the mucosa of the larger bronchi and occurs in the early stages of this disease rather than in the advanced later stages.

Symptoms resembling tuberculous bronchiectasis were encountered in 6 patients. All six had collapse therapy; two had artificial pneumothorax and four had thoracoplasty. The course of the disease followed the typical pattern of bronchiectasis; namely, frequent hemoptysis, or blood-tinged sputum, bouts of fever, intermittent cough and expectoration of large amounts of sputum. For the most part, their mode of life was that of a semi-invalid. Rest treatment had little or no influence on the course of the disease.

Anaerobic infection with abscess formation is a very serious complication. It occurred in two cases following complete stenosis of the bronchi.

CASE HISTORIES

Case I—Miss M. B., age 29, was first examined in 1938 as a contact case. She gave a history of having frequent colds, however, in the past two years, which caused her to wheeze. X-ray examination (Fig. 1) showed no definite abnormalities in the lung fields. Physical exam-

*Figure 1**Figure 2**Figure 3*

ination did reveal many dry palpable sonorous rales as well as occasional subcrepitant rales at the left base. The wheezing persisted and the cough gradually increased in severity. She was treated in the allergy clinic for six months with very little relief. Search was then made for tubercle bacilli and a high Gaffky count was found. Roentgenographic examination at this time revealed an area of mottling around the left hilum with a flare toward the periphery.

Pneumothorax therapy was instituted on the left side resulting in complete collapse of the lung (Fig. 2). The wheezing subsided and for a time, the patient made rapid improvement. The left lung, however, remained opaque and she developed a small pleural effusion. After two years of pneumothorax therapy, she began to have attacks of fever, distressing cough and the sputum again became positive. Bronchoscopic examination disclosed marked narrowing of the left main orifice. In spite of lengthening the intervals between refills, the lung showed little or no tendency for re-expansion (Fig. 3). The patient continued to run a down-hill course with low-grade fever. Bronchoscopic treatment was deemed inadvisable because of the stenosis which was already present. Resection of the left lung was therefore carried out two years ago, with apparently good results.

This case demonstrates early bronchial disease with no apparent parenchymatous involvement. The infiltration around the hilum rather than at the periphery is also quite suggestive of early endobronchial tuberculosis.

Case II—Miss J. Y., age 37, was first seen in September, 1940, because of a persistent cough which lasted for many months. Physical examination revealed many moist rales at the left base with evidence of cavitation at the same area. X-ray film (Fig. 4) showed a cavity at the left base with a surrounding area of atelectasis. Sputum was found to be positive.

Pneumothorax therapy in this case resulted in complete collapse of the left lung with an opaque shadow at the base (Fig. 5). Bronchoscopy



Figure 4



Figure 5

Figure 6

showed granulation tissue, about 2 cm. below the carina, of the left main bronchus, just above the orifice of the left upper lobe. There was also stenosis of the left main stem bronchus leaving a lumen not over 2-3 mm. in diameter. Re-expansion of the lung was found to be impossible (Fig. 6). In spite of being in bed, she continued to have frequent attacks of fever as well as an annoying wheeze. Because of the marked narrowing of the lumen of the main bronchus, pneumonectomy was carried out in September, 1942. Since then, she has been asymptomatic.

In this case, the left basal involvement is suggestive of bronchial disease. The patient also had early atelectasis at the left base. The opaque lung following pneumothorax therapy is quite characteristic.

Case III—Mrs. S. B., age 42, was first seen in 1940 after she spent three years in a tuberculosis hospital as a very sick patient. She coughed and raised considerable sputum which showed a high Gaffky count.

Pneumothorax therapy was attempted but no free pleural space was found. Phrenicotomy on the right side had very little effect on the disease (Fig. 1). A two-stage thoracoplasty failed to close the cavity or convert the sputum. In fact, the cavity appeared to be under tension with some ballooning (Fig. 8). Bronchoscopic examination revealed active disease at the right upper lobe bronchus with many small areas of ulceration. Bronchoscopic therapy with 30 per cent silver nitrate apparently controlled the ulcerative lesion and further surgical revision is now contemplated.

If bronchoscopic therapy were carried out in this case prior to her thoracoplasty, sputum might have been converted and closure of the cavity might have been accomplished. However, four years ago, bronchoscopy prior to thoracoplasty was not routinely employed.

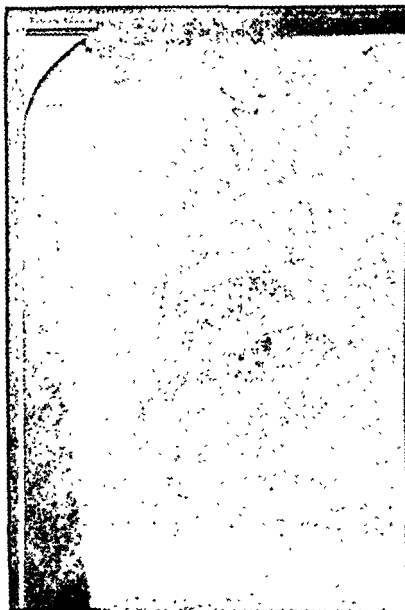


Figure 7



Figure 8

Case IV—Miss C. S., age 36, was first seen in consultation in 1938. Patient was apparently well until about 6 weeks ago when she contracted a cold and began to cough and raise. At times, she also noticed that she was wheezing. Sputum was found to be positive and x-ray examination disclosed an early lesion at the left upper lobe.

Pneumothorax therapy was immediately carried out, but to our surprise, a large ballooned-out cavity appeared (Fig. 9). Internal closed pneumolysis had no effect on the cavity, and accordingly, an open pneumolysis was done. Cavity however, remained open for about three months (Fig. 10). Subsequently, pneumothorax therapy was discontinued. The patient thereafter began to go down-hill. X-ray examination showed atelectasis of the left lung with evidence of abscess formation (Fig. 11). One month later, the abscess became putrid and patient began to raise large amounts of foul sputum (Fig. 12). Open drainage of the abscessed cavity was attempted but patient died suddenly, apparently of an internal hemorrhage.

Pneumothorax therapy in this case was distinctly harmful because it interfered with pulmonary drainage and created a good medium for anaerobic infection. Bronchoscopic treatment prior to pneumothorax or resection of the lung should have been carried out.

Case V—Miss M. E., age 18, was first seen in 1935. Patient's history was that of cough and wheeze for about one year. X-ray examination disclosed soft mottling at the left base with atelectasis in the region of the left hilum (Fig. 13). Sputum was positive.

Pneumothorax therapy was initiated on the left side with complete collapse of almost the entire lung plus an opaque area in the upper portion near the hilum (Fig. 14). Soon, however, the upper lobe became emphysematous and was collapsed with great difficulty (Fig. 15). Wheezing continued and patient showed signs of dyspnea. Because of the difficulty of collapsing the upper lobe, pneumothorax therapy was dis-

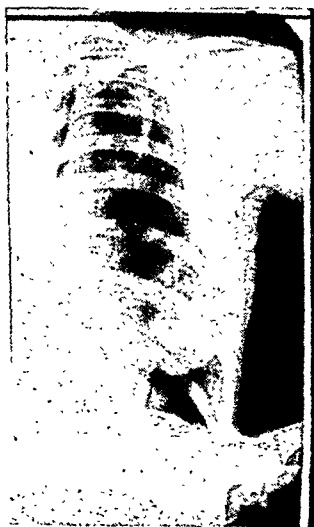


Figure 9



Figure 10

continued and the left lung apparently re-expanded rapidly (Fig. 16). Bronchoscopy was not done during this period since all her symptoms were ascribed to allergic asthma. Not until she came down with a severe attack of grippe about one year later, was bronchoscopy carried out. The lumen of the left main bronchus was almost completely stenosed. The patient developed suppuration of the entire left lung and died of general sepsis.

In this case, the wheezing and the emphysema of the upper lobe should have been indications for earlier bronchoscopy.

DISCUSSION

It is not within the scope of this paper to discuss the clinical course or the therapy instituted in all of these cases. That the treatment of endobronchial tuberculosis is still unsatisfactory is quite evident. Whether topical applications with silver nitrate, x-ray therapy, conservative treatment or early radical resection is the treatment of choice awaits the experience of many more years of observation. The diagnosis as well as the treatment of tuberculosis requires meticulous care and the mutual co-operation of the various specialities. Only with close scrutiny, utilizing all the methods at our command, can we ever hope to have a definite insight and intelligent understanding of so protean a disease as tuberculosis.

SUMMARY

- 1) Endobronchial disease is not an uncommon finding in pulmonary tuberculosis. It probably occurs in 5-15 percent of all tuberculous patients.

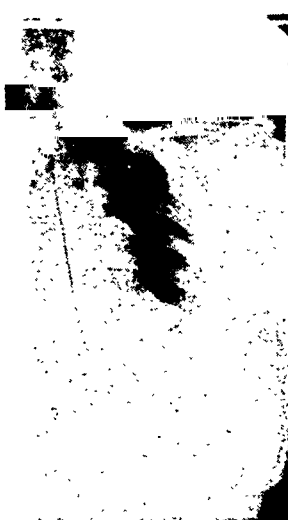


Figure 15



Figure 16

2) Bronchial obstruction as a result of bronchial disease alters the clinical course as well as the prognosis of pulmonary tuberculosis.

3) The signs and symptoms are essentially those of partial atelectasis with resultant superimposed infection.

4) Localized wheeze or loud rhonchi are the most important physical signs but are not pathognomonic.

5) Roentgenologically, areas of atelectasis, especially at the left base or the opaque lung following pneumothorax therapy, are strongly suggestive of this complication.

6) Bronchoscopy, when clear visualization is possible, is our only means of establishing a definite diagnosis.

7) Wider use of the bronchoscope in all suspicious cases of endobronchial tuberculosis is recommended.

Discusión

No cabe dentro de los límites de este trabajo el discutir ni la evolución clínica ni la terapéutica aplicada en todos estos casos. Es evidente que el tratamiento de la tuberculosis endobronquial todavía no es satisfactorio. La experiencia de muchos años más de observación demostrará si el tratamiento de elección es el de la aplicación local del nitrato de plata, la radioterapia, el tratamiento conservador o la resección radical temprana. El diagnóstico y el tratamiento de la tuberculosis requieren cuidado escrupuloso y la cooperación mútua de las varias especialidades. Solamente con el escudriñamiento íntimo, utilizando todos los métodos a nuestra disposición, podremos esperar adquirir una idea bien definida y una comprensión bien fundada de una enfermedad tan variable como la tuberculosis.

Resumen

1) Lesiones endobronquiales no son hallazgos raros en la tuberculosis pulmonar, pues sobrevienen probablemente en del 5 al 15 por ciento de pacientes tuberculosos.

2) Obstrucción bronquial, causada por lesiones bronquiales, altera la evolución clínica y el pronóstico de la tuberculosis pulmonar.

3) Los signos y síntomas son, en lo esencial, los de atelectasia parcial con la infección superpuesta resultante.

4) Estertores sibilantes o fuertes estertores roncantes, localizados, son los signos físicos más importantes, pero no son patognomónicos.

5) Desde el punto de vista roentgenológico, áreas de atelectasia, especialmente en la base izquierda, o el pulmón opaco subsecuente al neumotórax artificial, son signos que sugieren la presencia de esta complicación.

6) La broncoscopia, cuando es posible la visualización clara, es el único medio de establecer el diagnóstico bien definido.

7) Se recomienda el uso más extenso del broncoscopio en todo caso sospechoso de tuberculosis endobronquial.

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Pulmonary Resection for Tuberculosis Complicated by Tuberculous Bronchitis (Preliminary Report) **

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Two very significant advances have been made in the field of tuberculosis in the past decade. In the first place, most of our knowledge concerning tuberculous tracheobronchitis has been developed during this period. Secondly, lobectomy and pneumonectomy for pulmonary tuberculosis have become procedures with such a margin of safety that they should be considered in any therapeutic program in handling such cases.

Tuberculous tracheobronchitis has been established as one of the most common and most serious complications of pulmonary tuberculosis. The frequent occurrence of this complication has been demonstrated by the reported 40 per cent incidence in autopsy series^{2,9} and also by a 10 to 15 per cent incidence on routine bronchoscopic examination of patients upon admission to sanatoria.^{6,9} The serious prognosis and the complex therapeutic problem presented by tuberculous tracheobronchitis has been emphasized many times in the literature. Treatment is especially difficult, for one must contend with two large factors: (1) the type, location and extent of the parenchymal lesion, and (2) the type, extent and severity of the bronchial lesion itself. During the past few years, numerous clinical studies have revealed not only the limitations, but also the actual danger of many collapse procedures in such cases. These studies have established the fact that the more extensive the bronchial involvement, the less likely is any collapse procedure to succeed. It has also been shown that apparent complete control of the parenchymal lesion is not necessarily followed by a corresponding improvement in the bronchial lesion itself.¹ Most authors agree that pneumothorax and phrenic paralysis are contraindicated in the face of extensive bronchial ulceration or marked stenosis because of the high incidence of atelectasis, unexpandable lung, empyema and anaerobic infection. Complete thoracoplasty has given by far the best results in any of the larger series reported. Analysis of the reported series, however, suggests that thoracoplasty has been applied to only a fraction of patients with tracheobronchial involvement. Many cases with complicating tuberculous

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bronchitis progress rapidly and probably never are considered suitable for thoracoplasty. Only those patients who weather the storm and gradually settle into a more or less stabilized form of disease live to be acceptable for thoracoplasty. The incidence of tension cavities, basal disease and widespread active disease is high in patients with bronchial involvement and associated stenosis. They notably do poorly with thoracoplasty. Even in those cases which would appear to be suitable for thoracoplasty, the operative procedure, although done in carefully graded stages, has not been without danger. The postoperative course has tended to be very stormy and the incidence of spread and late exacerbation in the parenchyma distal to the involved bronchus has been high.

Because of an actual or predicted failure with collapse procedures, pulmonary resection has been carried out in an increasing number of patients with this complicated form of tuberculosis. The present report deals with 30 patients treated by one of us (R. H. O.) Resections were performed between 1934 and January 1, 1944.* Pre-operatively these patients fell into two classifications as to risk involved: desperate or last resort (12 patients) and reasonable (18 patients). Many of the desperate risks had active disease which

*During this period of time a total of 78 resections had been performed for pulmonary tuberculosis. The incidence of bronchial disease as diagnosed by bronchoscopy in this entire group was 38.4 per cent.

TABLE I

GENERAL STATISTICS

I. Total number of patients	30	B. 6 months to 1 year	8
II. Total number of operations	30	C. 1 year to 2 years	2
A. Pneumonectomies	27	D. 2 years to 3 years	3
1. Right	10	E. 3 years to 4 years	4
2. Left	17	F. 4 years to 5 years	5
B. Lobectomies	3	G. 5 years to 6 years	2
1. Left lower	1	H. 6 years to 7 years	1
2. Rt. middle and lower	1	I. 7 years to 8 years	0
3. Lt. lower and lingula	1	J. 8 years to 9 years	0
III. Age of patients—21 to 57 years		K. 9 years to 10 years	0
A. 20 to 30 years	6	L. 10 years to 15 years	4
B. 30 to 40 years	18	VI. Type of endobronchial tuberculosis	
C. 40 to 50 years	3	A. Submucosal	1
D. 50 to 57 years	3	B. Ulceration	5
IV. Sex		C. Ulcero-stenosis	11
A. Male	6	D. Fibrous stenosis	13
B. Female	24	VII. Incidence of positive sputum at time of resection	
V. Duration of disease—7 weeks to 19 years		A. 29 of 30 patients	96.6%
A. Under 6 months	1		

was rapidly progressive. Others had been subjected to collapse procedures with failure to control the disease. In the opinion of those who were taking care of these desperate risk patients, they possessed a fatal type of tuberculosis, and resection offered them their only chance. Any salvage in this group could be considered as pure gain.

In Table I general data concerning these patients is given. Attention should be called to several significant facts: (1) 96.6 per cent of the patients had a positive sputum at the time of resection; (2) the sex ratio was 4 to 1 in favor of females, which is in keeping with most of the reported series on endobronchial disease; (3) the majority of patients were in the fourth decade of life; and (4) 24 of the 30 had stenotic bronchial lesions, 11 with associated ulceration. Five had ulcerative lesions. Only one had a submucosal type of tuberculous bronchitis and this was associated with marked edema which caused 50 to 60 per cent narrowing of the right upper lobe orifice. The distribution of the bronchial lesions was as follows:

Left lower lobe bronchus	3
Left upper lobe bronchus	2
Left main bronchus	13
Right main bronchus	3
Right upper lobe bronchus	4
Right middle and right upper lobe bronchi	1
Right intermediate and right upper lobe bronchi	1
Right intermediate bronchus	3

INDICATIONS

Table II presents the indications for resection in this series. There were four cases of associated suppurative disease. This was one of the most common indications for resection in pulmonary tuberculosis, with or without bronchial disease, several years ago. All four of these cases were operated on prior to 1939. Five cases had previously had thoracoplasty with failure to control the disease.

TABLE II
INDICATIONS FOR RESECTION
(30 cases)

I. Associated suppurative disease	4
A. Controlled tuberculosis with bronchiectasis in other lobes	1
B. Active tuberculosis with bronchiectasis in other lobes	2
C. Extensive bronchiectasis, abscesses, and tuberculosis	1
II. Post-thoracoplasty uncontrolled disease	5
III. Extensive, multilobar, predominantly unilateral tuberculosis	21

In 21 patients the indication for resection was the presence of extensive multilobar tuberculosis which was predominantly unilateral. Many of these cases were considered by their medical staffs to have a fatal type of disease in the lung which was to be resected.

COMPLICATIONS

Table III presents the complications encountered in this entire series. The statistics have been broken down into two groups: (1) cases operated on prior to January, 1942; and (2) those operated on since January, 1942. The reason for this division is the fact that surgical technique prior to this date was variable. In these early cases the pleural flap method of bronchial closure was not routinely used and the tourniquet method was employed in a few instances. Since January, 1942, the pre- and postoperative care and the operative technique have been fairly well standardized. This group seems to represent what pulmonary resection has to offer patients with bronchial disease today. As Table III indicates, 19 resections were performed between January, 1942, and January, 1944, all of which were pneumonectomies. It is noteworthy that there were no

TABLE III
COMPLICATIONS

I. Complications related to tuberculous infections				
	Prior to January, 1942 11 cases		January, 1942, to January, 1944—19 cases	
Wound infections	0	0	0	0
Temporary fistula	1	9.1%	0	0
Permanent fistula	2	18.2%	1	5.2%
Empyema	4	36.4%	2	10.5%
A. With fistula	3	27.3%	1 (mixed)	5.2%
B. Without fistula	1	9.1%	1 (staph.)	5.2%
Contralateral spread (P. O.)	1	9.1%	3	15.8%
Stump ulcer	?	?	4	21.0%
Post-operative contralateral exacerbation	0	0	2	10.5%
Late contralateral exacerbation	0	0	1	5.2%
Contralateral pleurisy with effusion	1	9.1%	1	5.2%
II. Complications related to surgical problem of pulmonary resection				
A. Pulmonary insufficiency				2
B. Embolism				1
C. Circulatory failure				1
D. Post-operative shock				1

wound infections in any of these cases and that with the modern technique of closing the bronchus there was only one fistula following January, 1942. This occurred nine months following resection in a patient who had not only an active bronchial lesion but also a positive pleural fluid prior to operation. Only two empyemas were encountered in this last series, one a mixed empyema associated with the fistula in the patient mentioned above, and one caused by staphylococcus aureus. The biopsy of the pleura in this latter case at the time the empyema was drained and the studies of the fluid failed to reveal any evidence of tuberculosis. This fact was of considerable interest inasmuch as this patient was known to have had clear pleural fluid which was positive for tubercle bacilli for at least two years prior to resection.

Contralateral spread during the postoperative period occurred in three of the cases in the latter series—an incidence of 15.8 per cent. This complication is still too common and represents one of the biggest problems to be solved in the field of resection for pulmonary tuberculosis. Contralateral pleurisy with effusion has developed in two instances. In one of these the fluid was negative by guinea pig inoculation, and in the other it was positive. In neither case has a parenchymal lesion developed in the underlying lung and both patients are at home and are clinically well at the present time. Two cases in this latter group developed contralateral exacerbation in the postoperative period, and one case developed a late exacerbation eight months after operation adjacent to an area previously involved.

Routine postoperative bronchoscopic examination revealed ulceration in the bronchial stump in 4 patients, an incidence of 21 per cent. This complication has not been mentioned statistically in other reports on resection. It is interesting that two of these patients had negative sputum repeatedly on all bacteriological methods except by guinea pig inoculation, and yet the secretions aspirated at the time of bronchoscopy were positive on direct smear. One of the other patients was positive on routine sputum examination and the fourth one was positive only on gastric washing. These patients had no symptoms which would lead one to suspect such a complication. Bronchoscopy is, of course, the only way to make the diagnosis. The lesions were treated with 30 per cent silver nitrate at two-week intervals. Three of them have cleared and secretions aspirated at the time of bronchoscopy are now negative on smear and concentration. Two are negative and one is positive on guinea pig inoculation. The fourth patient has not returned for regular treatment. In spite of the ulceration of the mucosa in these cases there has been no tendency for the bronchial closure to break down and fistulae have not developed.

MORTALITY

Mortality figures are shown in Tables IV and V. For the entire group the total operative mortality was 26.6 per cent. It should be emphasized, however, that all but one of these deaths occurred in those who were accepted as last resort or desperate risks. The operative mortality in reasonable risk cases was 5.5 per cent. There were three late deaths in this entire group and all of these were patients treated prior to 1942. One was among the reasonable risk cases and two were in the desperate risk group, changing the case mortality to 36.6 per cent. Since January, 1942, one of the twelve reasonable risk cases has died in the postoperative period. The cause of death was embolism. There have been no late deaths in this second group.

Tables VI and VII analyze the postoperative and late deaths. These tables show that most of the postoperative and late deaths have occurred in patients who were classified preoperatively as desperate risks. In fact, in the entire group only one of the eight patients who died in the postoperative period had been classified

TABLE IV
MORTALITY STATISTICS—ENTIRE SERIES
1934 to January 1, 1944
(30 resections)

I. Operative mortality	
Total	26.6% (8 of 30)
A. Reasonable risks	5.5% (1 of 18)
B. Desperate risks	58.3% (7 of 12)
II. Total case mortality	
Total	36.6% (11 of 30)
A. Reasonable risks	11.1% (2 of 18)
B. Desperate risks	75.0% (9 of 12)

TABLE V
MORTALITY STATISTICS
Resections between January, 1942, and January 1, 1944
(19 cases)

I. Operative Mortality	
Total	26.3% (5 of 19)
A. Reasonable risk cases	8.5% (1 of 12)
B. Desperate risk cases	57.1% (4 of 7)
II. Total Case Mortality	
(Identical with operative mortality in this group as there have been no late deaths.)	

TABLE VI
ANALYSIS OF POST-OPERATIVE DEATHS

Name	Age	Date of operation	Operation	Pre-op. classification Desp. risk	Reas. risk	Duration of illness	P.O. day of death	Cause of Death
Miss L. M.	57	2/6/41	Rt. M. & L. lobectomy	Yes		2 yrs.	32nd	Empyema, C.N.S. symptoms
Miss B. L.	33	9/26/41	L. pneumo-nectomy	Yes		10 yrs.	4th	Contralateral tuberculous, pneumonia
Miss V. N.	30	12/30/41	Rt. pneumo-nectomy	Yes		3 yrs.	4th	Pulmonary insufficiency
Mr. J. C.	54	3/29/43	Lt. pneumo-nectomy	Yes		4 yrs.	53rd	Contralateral exacerbation, pulmonary insufficiency
Mrs. A. B.	39	7/1/43	Rt. pneumo-nectomy	Yes		11 yrs.	15th	Embolism
Mrs. M. M.	32	5/3/43	Rt. pneumo-nectomy	Yes		2 1/4 yrs.	2nd	Circulatory failure
Miss M. F.	30	10/23/43	Rt. pneumo-nectomy	Yes		3 yrs.	Day of operation	Post-operative shock
Mr. J. G.	49	10/25/43	Rt. pneumo-nectomy	Yes		19 yrs.	19th	Pulmonary insufficiency

TABLE VII
ANALYSIS OF LATE DEATHS

Name	Age	Date of operation	Operation	Pre-op. classification Desp. risk	Reas. risk	Duration of illness	P.O. time of death	Cause of Death
Miss C. C.	28	2/23/35	Lt. pneumo-nectomy	Yes		14 mos.	6 mos.	Empyema, pneumonia, renal thrombosis, uremia
Miss V. D.	28	12/10/40	Rt. pneumo-nectomy	Yes		5 yrs.	19 mos.	Sudden death on street; cause unknown
Mrs. N. S.	34	9/11/41	Rt. pneumo-nectomy		Yes	10 yrs.	19 mos.	Died suddenly on 3rd day after plastic closure of bronchial fistula

preoperatively as a reasonable risk. Only one of three late deaths occurred in the reasonable risk group and this patient died fifteen months following operation, at which time sudden death occurred on the third day following a plastic closure of a bronchial fistula. As the tables show, only four deaths in the entire series can be attributed to the tuberculous infection. Five cases died of complications which were not related to the pulmonary tuberculous infection as such, but were related to the surgical problem of pulmonary resection. One of these cases died of pulmonary insufficiency on the fourth postoperative day. A second patient died suddenly of embolism on the fifteenth postoperative day. Up until this time her postoperative course had been entirely uneventful. A third case died of circulatory failure on the second postoperative day. A fourth patient died of postoperative shock two hours following operation. A fifth patient died of pulmonary insufficiency on the nineteenth postoperative day. All except the one who died of embolism were in very poor general condition.

PRESENT CLINICAL STATUS

The clinical status of the patients at the present time is as follows: Eleven have died. Of the remaining 19, 15 are clinically well. Of these 15 patients, 11 have been discharged from the sanatoria to their homes. The other four are still on bed rest either in the sanatorium or at home. One patient has a mixed tuberculous empyema and is awaiting thoracoplasty. One has ulceration of the bronchial stump and positive sputum. Recently this patient also developed a tuberculosis of the ilium and sacro-iliac joint. The two remaining patients have progressive contralateral lesions and will eventually die of tuberculosis.

The following is the data concerning the sputum examinations of the 19 living patients:

- 1) Four are positive by direct smear or concentration.
- 2) Twelve are negative by concentration
 - a) Three are also negative by culture
 - b) Two are also negative by guinea pig inoculation.
- 3) Two patients have had no sputum examinations since resection. The reason for this is listed in the sanatorium as "No cough or expectoration."
- 4) We have insufficient data to classify the one remaining case. However, she is well ten years following operation.

SURGICAL PATHOLOGY

The study of surgical specimens has enabled the pathologist to see the disease process in all stages of development as compared with autopsy studies where only late terminal types of disease are

seen. During the past year, Dr. William Meissner has studied the tuberculous lungs or lobes resected in the past ten years. Many significant facts regarding tuberculous bronchitis have come to light during this work. In the future, surgical pathology should enable us to understand better the disease process and to approach these cases with a more rational therapeutic program.

The actual incidence of tuberculous bronchitis by pathological study is much greater than that diagnosed bronchoscopically. Submucosal involvement with round cell infiltration and usually tubercle formation has been the earliest finding and has been present frequently when it was unsuspected. When ulceration or granulation tissue was present, the submucosal involvement was always more extensive, and the break in the mucosa merely represented that area where the bronchial disease had become an open focus. This is of significance because many times the bronchial amputation and suture lines are through an involved portion of the bronchus even when this is not suspected by either bronchoscopic or direct inspection. The draining bronchus of a cavity is involved almost without exception. This has been especially marked in lower lobe cavities, most of which are located in the superior division of this lobe. In most of these the draining bronchus has been extensively involved throughout and at times the entire bronchial mucosa has been destroyed and the bronchial lumen filled with caseous material. Many of these lesions will not be discovered by bronchoscopic examination as they are "around the corner" and are not visible. When resection is anticipated, however, and a cavity is present in this location, the draining bronchus should be considered to be involved. This brings up the question of whether a middle and lower lobectomy on the right side is not a more rational procedure for this type of lesion than a lower lobectomy. This would enable the bronchial suture line to be placed above the involved portion of the bronchial tree, and thus tend to avoid the complication of stump ulceration. This is one of the problems that time and more experience will have to answer.

The study of the parenchymal lesion in these cases has also been revealing. These have been characterized by the high incidence of basal disease, the extensiveness of the parenchymal lesion, and the tendency toward the bronchopneumonic type of tuberculous lesion. Examination of these specimens leaves little doubt that, should any of these cases be treated by any collapse measure, a large bulky mass of tuberculous lung would be collapsed and a huge amount of pathology remain as a threat in the future.

DISCUSSION

In 1942, Thornton and Adams reviewed the entire literature deal-

ing with pulmonary resection in pulmonary tuberculosis. Their review presented statistics on 29 pneumonectomies and 46 lobectomies, a total of 75 resections. A very high incidence of complications related to the tuberculous infection itself, such as persistent fistulae, empyema, and contralateral spread was reported. Their conclusions were as follows: "Resection of lung tissue is very hazardous in the presence of a positive sputum. If possible, collapse therapy is preferred." We, however, agree with Churchill and Klopstock that these conclusions are unwarranted because of the fact that this review of the literature represents a very heterogeneous group of cases operated upon with variable technique and often times without the diagnosis of pulmonary tuberculosis having been established prior to operation. In many of these cases tourniquet technique was used, and in our opinion the tourniquet is one instrument that has no place in the armamentarium of the surgeon performing resection for pulmonary tuberculosis. It has been our experience that the dissection of the hilum of the tuberculous lung can be dispatched with greater ease than when treating suppurative disease or cancer. This is due to the fact that usually mediastinal glands are small, cleavage planes are free, and anatomical structures are not distorted by the pathological process.⁴

In the light of recent experience with pulmonary resection for pulmonary tuberculosis, it can be stated that the modern technique of individual ligation of hilar structures and the meticulous closure of the bronchus with the reinforcing pleural flap has reduced two of the complications (fistula and tuberculous empyema) to a very low level. The third common complication, contralateral spread, is still a very definite threat. It has occurred in approximately 15 per cent of the entire resection series and in 15.8 per cent of the cases complicated by tuberculous bronchitis. An attempt is being made at the present time to overcome spilling at the time of operation by making the ligation of the bronchus a primary step in the resection. Recently, four resections (2 pneumonectomies and 2 lobectomies) have been performed under local anesthesia. A minimal spread was encountered in one of these cases. We are also anticipating the use of intrabronchial anesthesia which would permit the exteriorization of each lung and possibly prevent the intrabronchial spilling of secretions. This remains the one big problem to be solved in resection for tuberculosis. At present, it is the outstanding cause of failure. It is a challenge to the ingenuity of both the surgeon and anesthetist.

The question often arises as to whether resection can be safely performed through an involved area of the bronchus. This has been done on several of these cases and no fistulae have developed. Bronchial stump ulcers, however, have occurred in 21 per cent of

this series of cases, all of which had endobronchial tuberculosis prior to resection. This is a complication that must be reckoned with. It has been noted that most of these ulcers have occurred where the mattress sutures have been placed in the bronchus. For this reason, in the most recent resections, when feasible, mattress sutures have not been used. A shorter stump has thus been secured by using only end sutures in the bronchus. It is too early to tell whether or not this procedure will reduce the incidence of stump ulceration. Fortunately, local therapy with 30 per cent silver nitrate has given encouraging results in these cases.

The condition of the contralateral lung is of extreme importance and must be considered individually in each case. No definite criteria can be set up as to when a contralateral lesion will or will not contraindicate resection. If there is a receding lesion in the contralateral lung and the lesion in the lung to be resected is not progressive, time for more stabilization with bed rest may be given. If the lesion to be resected is threatening life, however, or progressing, resection is proceeded with and a chance is taken with the contralateral lesion. We do not agree with those who feel that the contralateral lung must be absolutely clear. Many of the cases in this series had evidence of a contralateral lesion and a few had considerable disease in the opposite lung at some previous time. Only three contralateral exacerbations have occurred.

The operative mortality has been reduced to an acceptable level in reasonable risk cases. In this series of 30 cases with endobronchial tuberculosis, the operative mortality in the reasonable risk cases is 5.5 per cent. Thus, given a patient who is in good general condition and who has been referred for operation before it is evident that he is a last resort case, pulmonary resection offers him a reasonably safe operation, with the possibility of getting rid of a tremendous amount of pathology in a very short time. The time has come to change our conception of pulmonary resection for pulmonary tuberculosis and to relegate the unwarranted fears of fistula and empyema to the past where they belong. Contralateral spread and bronchial ulceration are still two vital problems to be solved. These facts must be faced clearly.

The amount of lung tissue to be resected must be decided at the time of operation when the lung can be palpated. Not infrequently considerable tuberculosis is found in one of the lobes where it was not suspected, necessitating a pneumonectomy where a lobectomy had been planned. In cases where the endobronchial tuberculosis has involved the major bronchi, particularly when stenosis is present, pneumonectomy can be decided upon prior to exploration.

Pneumonectomy finds a greater place in the treatment of these cases with this complication than does lobectomy, because of the

location of the bronchial disease and the usual accompanying widespread parenchymal involvement. If possible, the bronchus should be amputated at a level above that where the bronchial disease is evident. Resection in these cases has two purposes: (1) to remove all of the parenchymal disease, and (2) to remove all of the bronchial lesion, if this can be done. On the right side, in the case of basal tuberculosis, lobectomy is more feasible than on the left side because oftentimes the intermediate bronchus is free of disease. This would permit a middle and lower lobectomy with the suture line above the diseased area, leaving behind a normal bronchus and a normal upper lobe. On the left side, lower lobectomy finds a very limited field in cases with bronchial lesions and is applicable only to those which have bronchial lesions well below the level of the superior division. These are rare.

CASE REPORTS

Figures 1a and 1b: Mrs. E. M. A 45-year-old female. Classified pre-operatively as desperate risk.

Figure 1a, upper left: Roentgenogram in 1938, showing lesion at left apex with small cavity. Patient treated with bed rest and phrenic. Pneu-

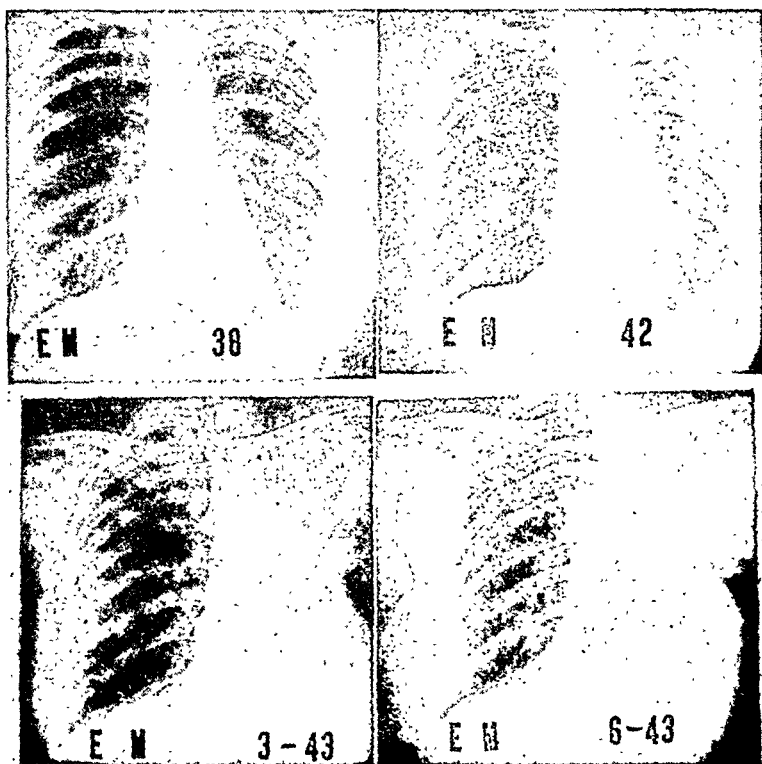


FIGURE 1a

mothorax impossible because of adhesions. Disease progressed slowly.

Figure 1a, upper right: Roentgenogram in 1942. Note retraction of mediastinum, increase in size of cavity and extension of disease. Lower lobe relatively clear. Three-stage thoracoplasty performed in June, July, and August, 1942. Postoperative course stormy. Left lung became opaque and nodular spread occurred to right lung. Sputum remained positive. Bronchoscopy revealed ulcerostenosis of left main bronchus.

Figure 1a, lower left: Roentgenogram in March, 1943, six months following thoracoplasty and just prior to pneumonectomy, which was performed on April 16, 1943. Note extensive nodular spread in right lung and appearance of collapsed lung.

Figure 1a, lower right: Roentgenogram two months following pneumonectomy. Lesions in right lung have not extended but appear more fibrotic.

Figure 1b: Surgical specimen has been cut in two planes. Upper lobe residual cavity is very small. Note extensive involvement of lower lobe, which was relatively clear on x-ray prior to thoracoplasty. This case demonstrates increase in disease beyond the bronchial stenosis commonly seen with any collapse procedure. Main bronchus and smaller bronchi of both lobes were markedly involved with an active tuberculous bronchitis.



FIGURE 1b

Patient still has slight cough and expectoration. Sputum is positive. Bronchoscopy reveals ulceration of bronchial stump. Recently extrapulmonary tuberculosis involving the ilium and sacro-iliac joint developed.

Figure 2: Mrs. G. T. A 35-year-old white female; duration of illness $3\frac{1}{4}$ years. Left pneumothorax had existed for three years. Fluid had been present on this side intermittently during two years prior to operation and had been shown to be positive for the tubercle bacillus. Pre-operative bronchoscopy revealed a marked stenosis of the left main bronchus at its orifice with considerable granulation tissue present. Pneumonectomy was performed on June 21, 1943. In the postoperative period patient developed a Staph. aureus empyema which was drained by rib resection. Since then this space has been obliterated by thoracoplasty except for a narrow sinus tract. Fluid removed at the time of the empyema drainage was negative by guinea pig inoculation and

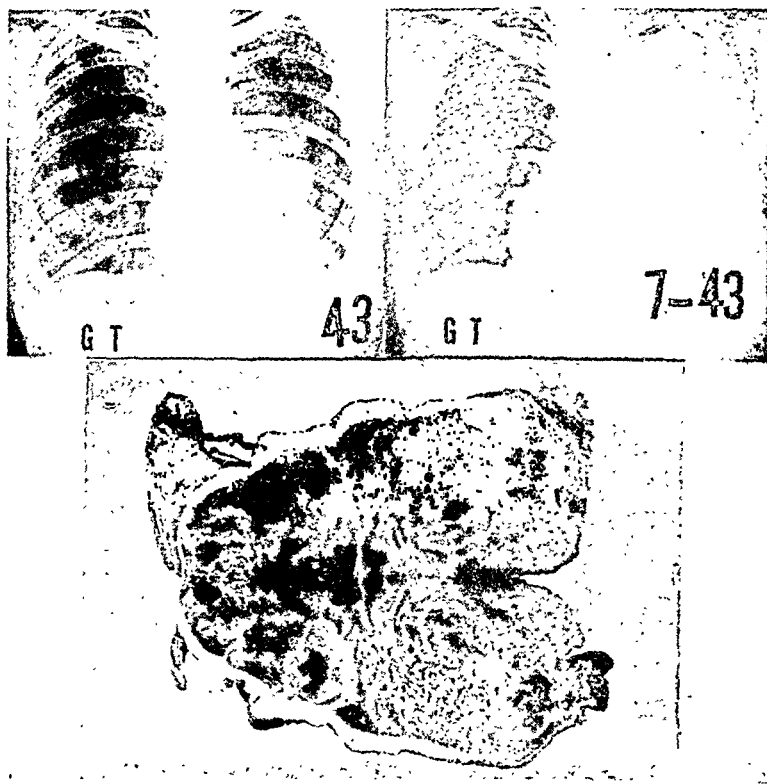


FIGURE 2

Upper left, reveals the preoperative film, showing the dense left lung under pneumothorax.—*Upper right,* shows the postoperative film before the drainage of the empyema space.—*Lower center,* shows the pathological specimen. Note the widely distributed involvement of the entire lung with caseous foci and the extensive fibrosis; also the markedly thickened pleura. Study of the surgical specimen revealed a one and one-half cm. cavity in the superior division of the lower lobe and scattered tuberculous nodules throughout both lobes.

biopsy of the parietal pleura failed to reveal any evidence of tuberculosis. At the present time this patient is asymptomatic and well. She is still in the sanatorium under observation. Her sputum is negative on smear and concentration.

Figures 3a and 3b: Miss J. Y. A 39-year-old female. Onset of tuberculosis in 1940. Classified preoperatively as reasonable risk.

Figure 3a, upper left: Roentgenogram of chest in September, 1940. Note basal distribution of disease, retraction of mediastinum, elevation of diaphragm and large cavity far out in 5th anterior interspace. Also small lesion in 3rd anterior interspace on right. Bronchoscopy in July, 1942, revealed ulcerostenosis of left main bronchus.

Figure 3a, upper right: Roentgenogram prior to resection. Pneumonectomy performed September 18, 1942. Postoperative course uneventful. Postoperative bronchoscopy 6 weeks after operation revealed normal bronchial stump.

Figure 3a, lower left: Roentgenogram 6 months postoperative. No contralateral increase noted.

Figure 3a, lower right: Roentgenogram in August, 1943, 11 months

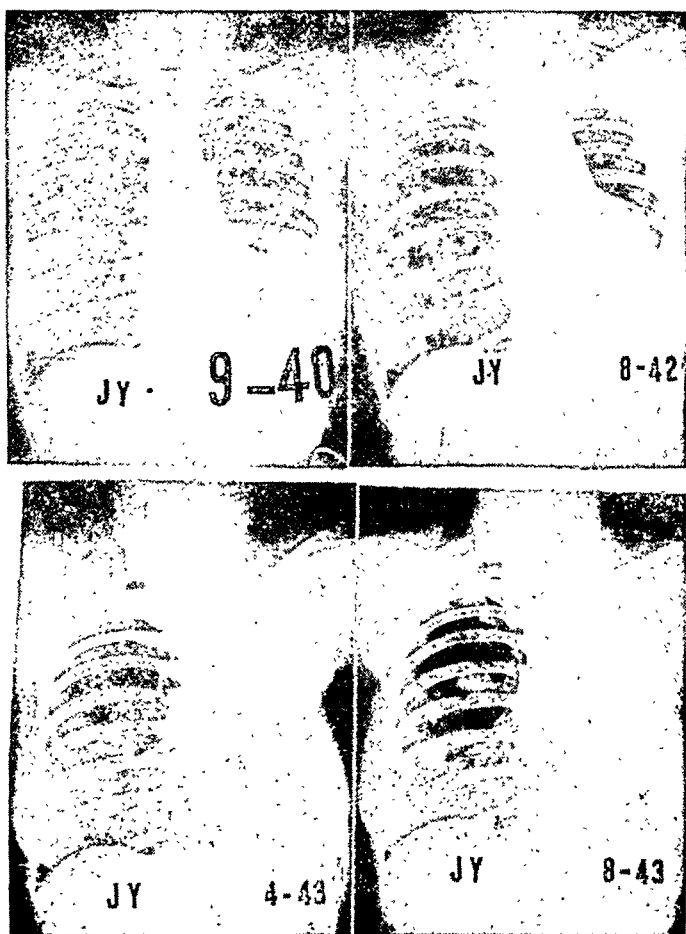


FIGURE 3a

postoperatively, showing contralateral increase adjacent to previous lesion on this side. Patient is asymptomatic and clinically well. Sputum negative on smear, concentration, and gastric. Secretions aspirated directly from the bronchial stump are also negative.

Figure 3b: Surgical specimen. There was extensive lower lobe disease with bronchiectasis. Note the marked involvement of upper lobe, which was relatively clear by x-ray in 1940.

Figure 4: Miss A. G. A 41-year-old white female; duration of illness ten months. Treated prior to pneumonectomy with left pneumothorax. Left lung became densely opaque following pneumothorax and bronchoscopy revealed an ulcerostenosis of the left main stem bronchus. Pneumonectomy was performed on March 25, 1941. Patient made an uneventful recovery from operation and has been completely well since. Her sputum is negative to all tests including culture and guinea pig inoculation of gastric washings.

The patient is now working full time and is completely asymptomatic. Her general condition is excellent.

SUMMARY

1) Data has been presented on 30 cases with endobronchial tuberculosis in which pulmonary resection has been used as a form of treatment. Of these 30 cases, 12 were desperate risks and 18 were reasonable risks. Patients facing an early fatal course were considered as desperate risks. Any salvage in this group was considered as pure gain.

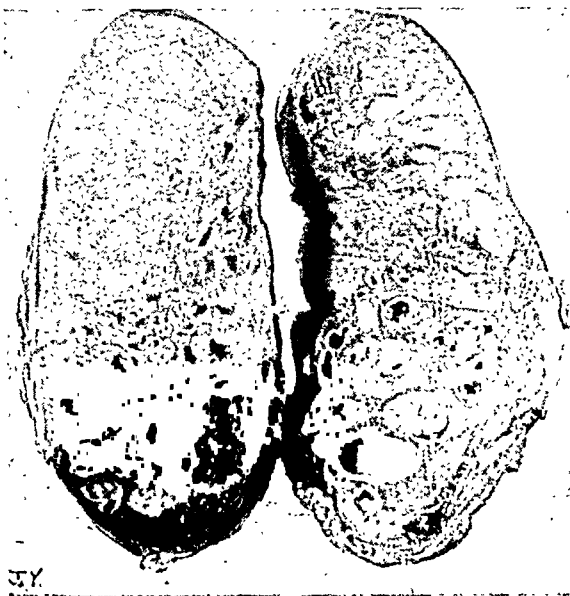


FIGURE 3b

2) The operative mortality in reasonable risks was 5.5 per cent and in desperate risks 58.3 per cent.

3) Tuberculous empyema and permanent fistula were eliminated as complications of pulmonary resection in all except one of the 19 patients treated after January, 1942, when individual ligation technique was employed and the bronchial stump was routinely reinforced with pleura.

4) Ulceration in the bronchial stump and contralateral spread were the most common complications and continue to challenge the thoracic surgeon.

5) Tuberculous bronchitis, either active or inactive, which must be traversed in doing a resection, is not within itself a contra-

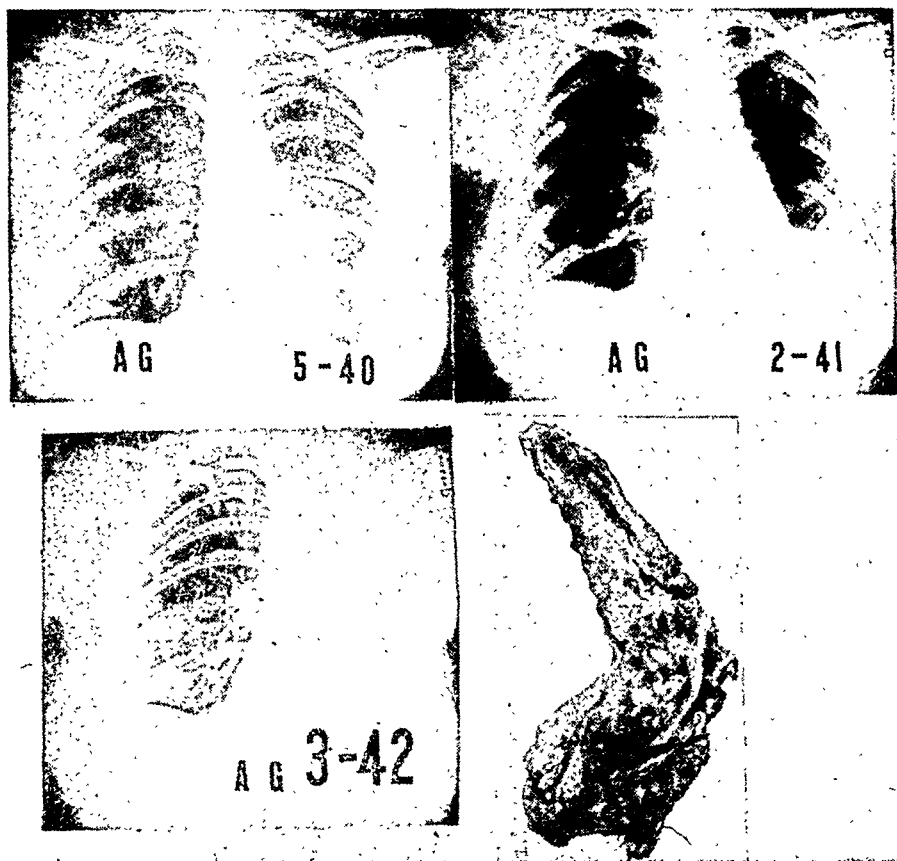


FIGURE 4

Upper left, shows the patient's x-ray at the time of admission to the sanatorium in May, 1940. Note the predominantly basal distribution of the lesion.—*Upper right*, shows the patient's x-ray just before pneumonectomy. The left lung has become densely opaque.—*Lower left*, shows the postoperative x-ray approximately one year following operation. This patient was last seen at the sanatorium in January, 1943, at which time her x-rays revealed no changes compared with this film.—*Lower right*, shows the pathological specimen. The pathological study revealed numerous caseous nodules scattered throughout the lung.

indication. On the contrary this complication often is an indication for resection.

6) Active tuberculosis in the lung to be resected, even if it is rapidly spreading, is not a contraindication to resection. In fact, delay may rob these patients of their only chance to get well.

7) A contralateral lesion in itself is not a contraindication to resection, unless this lesion is uncontrolled or uncontrollable.

CONCLUSIONS

The experience of the past few years has shown us how utterly mistaken we have been about performing surgery on tuberculous tissue. Improved operative technique has almost eliminated two of the great hazards of a few years ago—namely, fistula and tuberculous empyema. The high incidence of these complications in the past has not been due to the tuberculous infection *per se* but to improper technique. Contralateral spread remains the great hazard to the tuberculous patient facing resection today. Different surgical and anesthetic procedures are now being tried in an attempt to overcome the spilling of secretions during the operative procedure which is the cause of this complication.

Any report on pulmonary resection in the treatment of tuberculosis must at this time be considered a preliminary one. Because of the nature of the disease being treated, time and careful follow-up of patients will eventually show us the true value and the proper place of this procedure. Thus, until further experience has been gained, it should be used with great caution.

Resection of lung tissue, especially for tuberculosis, is a formidable operative procedure. It should be performed only by those with considerable experience with this type of surgery and only when all therapeutic adjuncts are available. The service of a well-trained physician anesthetist is imperative.

The failures and complications of collapse procedures should be anticipated in patients with bronchial disease, particularly when the danger signs of ulceration and stenosis are present. The need at present is to discover these complicated cases early and to do the resection before the patients have become desperate risks.

Resection should not be considered as a competitive, but rather as a supplementary type of therapy to the other well-established forms of treatment. Pulmonary resection in the future will become a valuable addition to our armamentarium in the treatment of certain forms of pulmonary tuberculosis with or without a complicating tuberculous bronchitis.

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Brookline, Mass.

Resumen

1) Se ha presentado datos sobre 30 casos con tuberculosis endobronquial en los cuales se empleó la resección pulmonar como tratamiento. De estos 30 casos, 12 eran riesgos operatorios desesperados y 18 eran riesgos medianos. Se consideraron riesgos desesperados a aquellos pacientes en quienes se esperaba un desenlace fatal cercano. Todo caso salvado en este grupo se consideró como ganancia pura.

2) La mortalidad de operados en los riesgos medianos fue de 5.5 por ciento y en los riesgos desesperados de 58.3 por ciento.

3) Se eliminó el empiema tuberculoso y la fístula permanente como complicaciones de la resección pulmonar en todos, excepto uno, de los 19 pacientes tratados después de Enero de 1942, en los que se empleó la técnica de ligación individual y se reforzó sistemáticamente el muñón bronquial con pleura.

4) Ulceración del muñón bronquial y propagación contralateral fueron las complicaciones más comunes, y continúan desafiando al cirujano del tórax.

5) La bronquitis tuberculosa, ya sea activa o inactiva, que es necesario atravesar para ejecutar la resección, no es por sí misma una contraindicación. Por el contrario, esta complicación indica a menudo que debe hacerse la resección.

6) La tuberculosis activa en el pulmón que se va a extirpar, aunque se esté propagando con rapidez, no contraindica la resección. En realidad, la dilación puede quitar a estos pacientes su única oportunidad de curarse.

7) Una lesión contralateral, por sí misma, no contraindica la resección, a no ser que esta lesión no esté dominada o no sea dominable.

Conclusiones

La experiencia de los últimos pocos años nos ha demostrado el gran error que hemos estado cometiendo al ejecutar operaciones en tejidos tuberculosos. El perfeccionamiento de la técnica operatoria casi que ha eliminado dos de los grandes riesgos de hace unos pocos años, a saber: la fístula y el empiema tuberculoso. La alta frecuencia de estas complicaciones en el pasado no se ha debido a la infección tuberculosa misma sino a técnica impropia. La propagación contralateral todavía es hoy el mayor riesgo operatorio de la resección pulmonar por tuberculosis. Actualmente se están ensayando diferentes procedimientos quirúrgicos y anestésicos a fin de eliminar el derrame de las secreciones durante la operación, que es la causa de esta complicación.

Al presente, cualquier informe sobre la resección pulmonar en el tratamiento de la tuberculosis debe considerarse un informe preliminar. A causa de la índole de la enfermedad bajo tratamiento, sólo el tiempo y la cuidadosa observación subsecuente de los pacientes nos demostrará finalmente el verdadero valor y la exacta posición de este procedimiento. Así es que debe emplearse con gran prudencia hasta que se haya adquirido mayor experiencia.

La resección de tejido pulmonar, especialmente por tuberculosis, es un procedimiento operatorio formidable que debe ser ejecutado únicamente por aquellos que tengan considerable experiencia en este tipo de cirugía, y solamente cuando todos los auxiliares terapéuticos indispensables se encuentren a su disposición. Los servicios de un médico experto en la anestesia son imprescindibles.

Se debe prever fracasos y complicaciones de la colapsoterapia en pacientes con lesiones bronquiales, especialmente cuando existan signos indicativos de ulceración y estenosis. Urge al presente que se descubra tempranamente a estos casos complicados y que se lleve a cabo la resección antes de que los pacientes se conviertan en casos desesperados.

No se debe considerar la resección una terapéutica competidora sino más bien suplementaria a los otros tratamientos ya establecidos. La resección pulmonar llegará a ser en el futuro una adición valiosa al tratamiento de ciertas formas de tuberculosis pulmonar, complicada o no por la bronquitis tuberculosa.

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JAY ARTHUR MYERS, M.D., F.C.C.P.

President

1944-1945

President's New Year Message

As a last word on the subject of tuberculosis to the general practitioner, Osler said: "The leadership of the battle against this scourge is in your hands. Much has been done; much remains to do. By early diagnosis and prompt, systematic treatment of individual cases, by striving in every possible way to improve the social condition of the poor, by joining actively in the work of the local and national tuberculosis societies, you can help in the most important and the most hopeful campaign ever undertaken by the profession."

When the American College of Chest Physicians was organized, its most appealing project was to restore the general practitioner to his rightful place in the diagnosis, treatment and prevention of tuberculosis. It was recognized that approximately 30 million persons are examined in hospitals and probably an additional 20 million in physicians' offices each year and that the general practitioner does the lion's share in this work. To equip him with the latest information and the complete armamentarium for combatting tuberculosis was a most laudable undertaking. This was a niche which had not been filled in the tuberculosis field. One of the important steps in attaining this goal was to have meetings of the various chapters of the College held in conjunction with district and state medical associations, and the annual meeting of the College with the American Medical Association. Already this has done much to stimulate the interest of the medical profession in tuberculosis. Another important step was to provide a journal for the publication of practical articles on the various diseases of the chest. From a small beginning this journal, now under the editorship of Dr. Ralph Matson, has evolved into one of the best of its kind. One of the most important projects that has been proposed is that by Dr. E. W. Hayes, Chairman of the Council on Undergraduate Medical Education of the College, for the publication of a book to include the essentials of diagnosis, treatment and prevention of chest diseases for medical students. This should aid greatly in preparing the oncoming generation of doctors in this field.

The predicted increase in mortality from tuberculosis throughout the United States for 1943 and 1944 did not occur, but there is good reason to believe that the inability to operate all of our sanatoriums and hospitals as efficiently as in the past, through decrease of personnel and the increase in exposure to contagious cases of tuberculosis of our men and women in military service in those parts of the world where the tubercle bacillus is well-nigh ubiquitous has resulted in much more than the usual seeding of tubercle bacilli. The crop has not had time to mature, but it will yield a large harvest in subsequent years.

Tuberculosis is so prevalent in the world that even before the present war it caused more disability and death than any other disease, except in the occasional year when it was superseded by malaria. With the unleashing of tubercle bacilli in so many parts of the world incident to the war, there has occurred a tremendous seeding and reseeded of human bodies, which must soon result in an increased morbidity. It is therefore exceedingly fortunate that the American College of Chest Physicians has become well organized and its chapters are widely distributed in many parts of the world, particularly the western hemisphere. Qualifications for membership are so high that only especially well trained physicians are admitted. Therefore this organization is now in a splendid position to serve as a stabilizing agent in tuberculosis control. It should assume the responsibility of protecting the public against fads and fancies, short-cut and slipshod methods. It is in a position to recommend to all the most effective procedures in the diagnosis, treatment and prevention of tuberculosis.

Tuberculosis is a world-wide problem. It no longer suffices to control the disease in one's community, state or nation, without at the same time assisting in its control in other nations. In this country we are in a splendid position to support the tuberculosis control program of the United States Public Health Service, directed by Dr. H. E. Hilleboe and to cooperate with all other organizations in the field of tuberculosis. Duplication of effort should be avoided, as there is work for all, and more work than all can do.

As great as the tuberculosis problem is, the American College of Chest Physicians does not limit its activities to this disease. It has other weighty problems to help solve, such as malignant and benign tumors of the chest, pneumococcosis, fungus infections, pneumonia, suppurative conditions, et cetera.

As 1944 closed, the American College of Chest Physicians could look back with pride upon its accomplishments. As 1945 begins, although we are faced with momentous problems, the medical profession is in a better position to solve them than at any previous time in history. If each of us works diligently in his own sphere, disseminates information to others, participates in the activities of other organizations in the same field, and consciously searches for truth, greater success will be achieved in controlling diseases of the chest.

SEMI-ANNUAL MEETING OF THE BOARD OF REGENTS AMERICAN COLLEGE OF CHEST PHYSICIANS

HOTEL DeSOTO, ST. LOUIS, MISSOURI

November 13, 1944

The following resolutions were introduced and adopted by the Board of Regents:

1. That physicians in addition to the requirements for membership as now set forth in the By-Laws of the American College of Chest Physicians must devote a minimum of fifty per cent (50%) of their professional activities to diseases of the chest organs in order to be eligible for *Fellowship* or *Junior Fellowship* in the College. Other physicians who have established their interest in diseases of the chest and who are able to meet the minimum requirements of the College may become *Affiliates* of the College by application.

The above resolution, in accord with the By-Laws, is being published in the official journal of the College and will be voted upon by the membership at large at the next annual meeting to be held in Philadelphia, June 16-19, 1945. Should the resolution be adopted, Associate Fellows will become Junior Fellows and Associate Members will become Affiliates of the College.

2. Dr. Nelson W. Strohm, Buffalo, New York, introduced a plan proposed by Dr. George Foster Herben, Governor of the College for New York State, concerning postgraduate medical education for physicians who are released from the armed services into civilian life. The plan was acted upon favorably by the Board of Regents and referred to the Council on Postgraduate Medical Education.
3. The Union of Latin American Societies Against Tuberculosis (ULAST) will hold its Sixth Annual Congress at Havana, Cuba, January 15-21, 1945. An invitation was received from Dr. Juan J. Castillo, F.C.C.P., Havana, Cuba, President of the Congress, asking that the American College of Chest Physicians send an official delegation to this Congress. The Board of Regents authorized Dr. Jay A. Myers, President of the College, Dr. Chevalier L. Jackson, Chairman, Council on Pan-American Affairs, and Mr. Murray Kornfeld, Executive Secretary of the College, to attend the Congress at Havana, Cuba, as official delegates of the American College of Chest Physicians.
4. A resolution previously adopted by the Board of Regents to increase the annual dues in the College to \$12.50 for the duration of the war was rescinded and the dues for the year 1945 will remain at the present fee of \$10.00 per year.
5. Because of the recent organization of College Chapters, and for a more equitable distribution of regional districts to conform with the chapters established by the College, the following states have been re-grouped into regional districts to become effective June 15, 1945:
 - 1 New England States.
 - 2 New York State.
 - 3 Pennsylvania, New Jersey, Delaware.
 - 4 Maryland, Virginia, West Virginia, District of Columbia.
 - 5 Florida, Georgia, North and South Carolina.
 - 6 Michigan and Ohio.
 - 7 Indiana and Illinois.
 - 8 Arkansas, Kansas, Missouri and Oklahoma.
 - 9 Alabama, Kentucky, Tennessee, Mississippi and Louisiana.
 - 10 North and South Dakota, Wisconsin, Iowa, Minnesota and Nebraska.
 - 11 Colorado, Utah, New Mexico and Wyoming.
 - 12 Texas.
 - 13 Arizona, California and Nevada.
 - 14 Oregon, Idaho, Montana and Washington.
6. That an engraved certificate for life membership in the American College of Chest Physicians be prepared by the Chairman of the Board of Regents and that these certificates be issued to Fellows of the College whose application for life membership have been approved by the Board of Regents, and that these certificates be numbered in the order in which the applications are received at the executive offices of the College.

Reports of Councils and Committees

The following councils and committees presented preliminary reports of progress to the Board of Regents:

- 1) Financial Report, Paul H. Holinger, M.D., F.C.C.P., Chicago, Illinois, Secretary-Treasurer.
- 2) Council on Undergraduate Medical Education, E. W. Hayes, M.D., F.C.C.P., Monrovia, California, Chairman.
- 3) Council on Postgraduate Medical Education, J. Winthrop Peabody, M.D., F.C.C.P., Washington, D. C., Chairman.
- 4) Council on Military Affairs and Public Health, Charles M. Hendricks, M.D., F.C.C.P., El Paso, Texas, Chairman.
- 5) Council on Sanatorium Standards and Administration, Benjamin L. Brock, M.D., F.C.C.P., Waverly Hills, Kentucky, Chairman.
- 6) National Council of Tuberculosis Committees, James H. Stygall, M.D., F.C.C.P., Indianapolis, Indiana, Chairman.
- 7) Membership Committee, Major General S. U. Marietta, M.C., F.C.C.P., Washington, D. C., Vice Chairman.
- 8) Committee on Occupational Diseases of the Chest, Louis Mark, M.D., F.C.C.P., Columbus, Ohio, Chairman.
- 9) Committee on State Laws for Tuberculosis, Andrew L. Banyai, M.D., F.C.C.P., Wauwatosa, Wisconsin, Chairman.
- 10) Scientific Program Committee, Minas Joannides, M.D., F.C.C.P., Chicago, Illinois, Chairman.
- 11) Ways and Means Committee (Diseases of the Chest), J. Winthrop Peabody, M.D., F.C.C.P., Washington, D. C., Chairman.
- 12) Board of Examiners, H. I. Spector, M.D., F.C.C.P., St. Louis, Missouri, Chairman.

* * * * *

Charles L. Harrell, M.D., F.C.C.P., Norfolk, Virginia, representing the Society of Chest Physicians of Virginia, asked the Board of Regents for an expression of opinion concerning the affiliation of that society with the American College of Chest Physicians and establishing a chapter of the College in the state of Virginia. Dr. Peabody introduced a resolution extending an invitation to those members of the Society of Chest Physicians of Virginia who are not now members of the College to apply for such membership. The Governor of the College for the state of Virginia is authorized in the College By-Laws to pass upon such applications and the Board of Regents agreed to give every applicant due consideration. The resolution was unanimously adopted.

The following Regents attended the meeting:

Dr. Joseph C. Placak, Cleveland, Ohio, *Chairman*
 Dr. Andrew L. Banyai, Wauwatosa, Wisconsin
 Dr. Edward W. Hayes, Monrovia, California
 Dr. Charles M. Hendricks, El Paso, Texas
 Dr. Paul H. Holinger, Chicago, Illinois
 Major General S. U. Marietta, Washington, D. C.
 Dr. Louis Mark, Columbus, Ohio
 Dr. Jay A. Myers, Minneapolis, Minnesota
 Dr. William E. Ogden, Toronto, Ontario, Canada
 Dr. Richard H. Overholt, Brookline, Massachusetts
 Dr. J. Winthrop Peabody, Washington, D. C.
 Dr. H. I. Spector, St. Louis, Missouri
 Dr. Nelson W. Strohm, Buffalo, New York
 Dr. James H. Stygall, Indianapolis, Indiana
 Dr. Paul A. Turner, Louisville, Kentucky

COMMITTEES MEET TO DISCUSS ORGANIZATION OF SPECIALTY BOARD

A joint meeting of committees representing the American Association for Thoracic Surgery, the American Broncho-Esophagological Association and the Society of Chest Physicians was held at the DeSoto Hotel, St. Louis, Missouri, November 14, 1944. Lt. Col. Richard H. Meade, Jr., M.C., Evarts A. Graham, M.D., F.C.C.P. and Jerome R. Head, M.D., F.C.C.P., represented the American Association for Thoracic Surgery; Paul H. Holinger, M.D., F.C.C.P., and Gabriel Tucker, M.D., represented

the American Broncho-Esophagological Association; J. Winthrop Peabody, M.D., F.C.C.P., Charles M. Hendricks, M.D., F.C.C.P., and J. C. Placak, M.D., F.C.C.P., represented the American College of Chest Physicians. Others who attended the conference in an advisory capacity were: Major General S. U. Marietta, Drs. E. W. Hayes, G. A. Hedberg, William A. Hudson, Louis Mark, Jay A. Myers, H. I. Spector, and Mr. Murray Kornfeld, Executive Secretary of the College.

Dr. Peabody, Chairman of the Committee, appointed by the American College of Chest Physicians to survey the possibilities for establishing a Board on Diseases of the Chest, called the meeting to order and explained the purpose of the conference. Letters from the officials of the American Heart Association and the American Trudeau Society were introduced and recorded in the proceedings of the meeting. After a lengthy discussion, the following resolution was introduced by Dr. Head: Resolved, that it be the consensus of opinion of the representatives of the societies assembled at this conference, that the American College of Chest Physicians, the American Trudeau Society, the American Association for Thoracic Surgery, and the American Broncho-Esophagological Association should appoint committees to meet jointly with the Advisory Board for Medical Specialties in order to discuss the question under consideration. This resolution was unanimously adopted and the meeting was adjourned.

CHAPTER MEETINGS

Cuban Chapter

The Cuban Chapter of the College is planning to hold a meeting of the members of the College from all of the Latin American republics who will attend the Congress at Havana. Plans for the further development of College activities in the other American republics will be discussed at the conference being arranged under the auspices of the Cuban Chapter.

Southern Chapter

The Second Annual Meeting of the Southern Chapter of the College was held at St. Louis, Missouri, November 13-14, 1944, jointly with the annual meeting of the Southern Medical Association. An excellent scientific program was presented under the chairmanship of Dr. Paul A. Turner, Louisville, Kentucky. The members of the Missouri Chapter of the College were the hosts for the meeting and the comforts of the visiting members were well taken care of by the Arrangements Committee under the chairmanship of Dr. H. I. Spector. Dr. Herman E. Hilleboe addressed the dinner meeting and presented the Tuberculosis Control Program of the U. S. Public Health Service. He spoke for nearly one hour and he discussed the program in great detail. The following officers were elected by the Southern Chapter of the College for 1944-1945:

Alvis E. Greer, M.D., F.C.C.P., Houston, Texas, President.

Carl C. Aven, M.D., F.C.C.P., Atlanta, Georgia, First Vice-President.

Paul A. Turner, M.D., F.C.C.P., Louisville, Kentucky, Second Vice-President.

Benjamin L. Brock, M.D., F.C.C.P., Waverly Hills, Kentucky, Secy.-Treasurer.*

*Re-elected.

There were 138 physicians registered at the Hotel DeSoto for the College meeting.

New York State Chapter

The New York State Chapter of the College will meet at the Hotel Biltmore, New York City, February 2, 1945. The following program has been arranged for this meeting:

Morning Session

James H. Donnelly, M.D., F.C.C.P., Buffalo, New York, *Presiding*, President, New York State Chapter.

"Diagnosis and Management of Suppurative Diseases of the Chest,"

Adrian A. Ehler, M.D., Albany, New York.

Discussion opened by: Ethan Flagg Butler, M.D., Syracuse, N. Y., and Chevalier L. Jackson, M.D., F.C.C.P., Philadelphia, Pa.

Luncheon

Guest Speaker, Major General S. U. Marietta, U.S.M.C., F.C.C.P., Washington, D. C.

Subject, "Rehabilitation of Military Personnel,"
(Colored Sound Motion Picture).

Afternoon Session

Samuel A. Thompson, M.D., F.C.C.P., New York, N. Y., *Presiding*,
First Vice-President, New York State Chapter.

"Routine Chest Roentgenograms of Hospital Admissions,"

George M. Scatchard, M.D., Buffalo, New York.

Discussion opened by: Donald McKay, M.D., F.C.C.P., Buffalo, N. Y.
Business Meeting.

New Jersey Chapter

The Fall Meeting of the New Jersey Chapter of the College was held jointly with the Passaic County Medical Society at the Valley View Sanatorium, Paterson, New Jersey, Tuesday night, November 21, 1944, with Dr. William Sullivan, President of the Passaic County Medical Society presiding. The following program was presented:

"The Medical Profession and Diseases of the Chest,"

Grant Thorburn, M.D., New York.

"Pulmonary Emphysema, A Most Common Medical Condition,"

Edgar Mayer, M.D., F.C.C.P., New York.

Discussion was opened by Norman Dingman, M.D., Paterson, New Jersey.

Dr. Stephen A. Douglass, President of the New Jersey Chapter of the College and Medical Director of the Valley View Sanatorium was host to the joint meeting of the two societies.

Illinois Chapter

The Illinois Chapter of the College met jointly with the Chicago Tuberculosis Society at the Bismarck Hotel, Chicago, Illinois, Thursday night, November 30, 1944, and the following program was presented:

"Idiopathic Spontaneous Pneumothorax," Edwin R. Levine, M.D., F.C.C.P.

"Several Interesting Chest Cases," Samuel Rosenbloom, M.D.

"Presentation of Cases of Sarcoidosis," Arnold Shamaskin, M.D., F.C.C.P.

"Cases of Pulmonary Tuberculosis Mistakenly Diagnosed as Non-Tuberculous,"

Jacob Mendelsohn, M.D., F.C.C.P.

"Surgical Non-Tuberculous Pulmonary Conditions Mistakenly Diagnosed as

Pulmonary Tuberculosis," Richard Davison, M.D., F.C.C.P.

"When Should Pneumothorax be Discontinued," Camillo Volini, M.D.

An interesting discussion followed the presentation of the papers.

Texas Chapter

The Texas Chapter of the College will hold its annual meeting at Galveston, Texas, May 7, 1945. They will meet jointly with the Texas State Medical Association which meets at Galveston, May 7-10, 1945.

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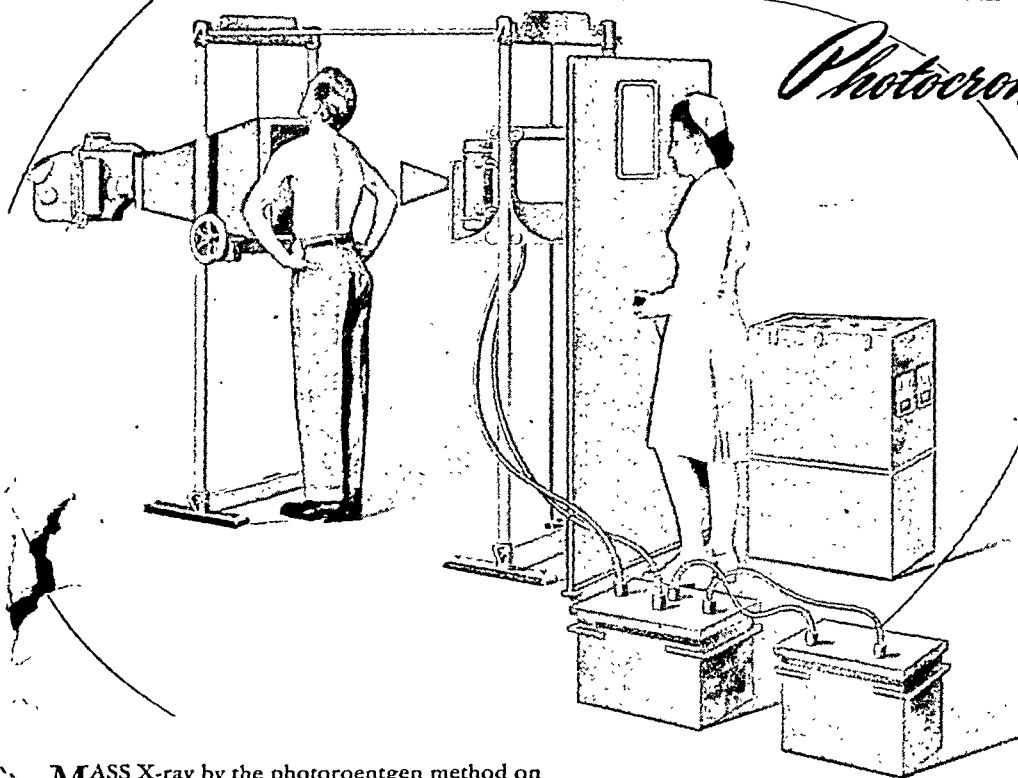
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CONTENTS:

Symposium on Tuberculosis in Institutions

INTRODUCTION	297
Otto C. Schlack, M.D., F.C.C.P., Oak Forest, Illinois	
TUBERCULOSIS CONTROL PROGRAMS	298
Chester A. Stewart, M.D., New Orleans, Louisiana	
TUBERCULOSIS IN INSTITUTIONS FOR THE MENTALLY ILL	304
Herbert A. Burns, M.D., F.C.C.P., St. Paul, Minnesota	
TUBERCULOSIS IN PRISONS	313
O. L. Bettag, M.D., F.C.C.P., Pontiac, Illinois	
TUBERCULOSIS IN AMERICAN COLLEGES AND UNIVERSITIES	340
Ruth E. Boynton, M.D., Minneapolis, Minnesota	
THE CARE OF THE TUBERCULOUS VETERAN	351
Colonel Roy A. Wolford, M.C., F.C.C.P., Washington, D. C.	
SOCIO-ECONOMIC PROBLEMS IN THE REHABILITATION OF THE TUBERCULOUS	356
Edward Hochhauser, New York, New York	
"INFORMATION PLEASE IN MEDICINE"	365
COLLEGE NEWS	372
COLLEGE NEWS NOTES	373

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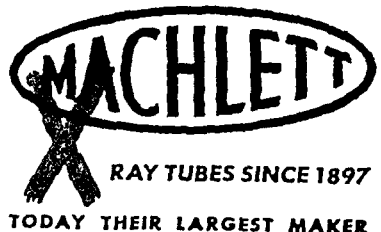
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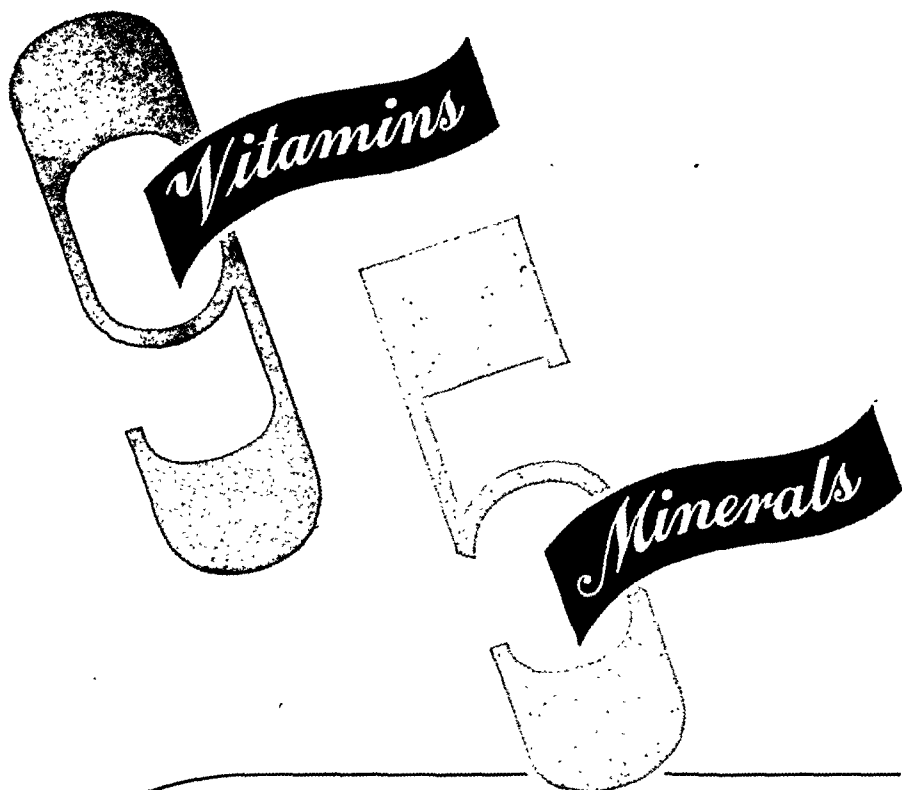
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Larsen, N. P.: Observations with Penicillin, Hawaii M. J. 3:372 (July-Aug.) 1944.

In 57 cases of staphylococcal bacteremia penicillin effected improvement usually within 48 hours and led to clinical recovery within 3 to 7 days. In most of these cases the improvement brought about in the patient's condition permitted postponement of surgical treatment of localized foci until the acute septic phase had passed. Penicillin was administered by continuous intravenous drip, 60,000 O.U. to 150,000 O.U. in each 24-hour period.

Lockwood, S. J.; White, W. L., and Murphy, F. D.: The Use of Penicillin in Surgical Infections, Ann. Surg. 120:311 (Sept.) 1944.

An 11 months old child with hemolytic streptococcal septicemia and bronchopneumonia developed serious kidney complications during sulfadiazine therapy, but recovered rapidly on penicillin (300,000 O.U. administered intramuscularly).

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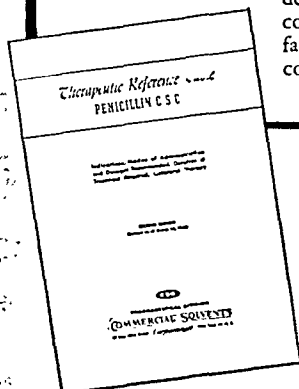
A patient with staphylococcal septicemia secondary to a leg abscess, who had relapsed after initial improvement under sulfadiazine and staphylococcus antitoxin therapy, recovered rapidly on a total dosage of 500,000 O.U. given intravenously.

A patient with an abscess of the prostate improved with aspiration of the abscess and administration of staphylococcus antitoxin, but improvement proceeded more rapidly and recovery followed when penicillin was given. Total dosage, 140,000 O.U. intravenously, 955,000 O.U. intramuscularly.

Stainsby, W. J.; Foss, H. L., and Drumbeller, J. E.: Clinical Experiences with Penicillin, Pennsylvania M. J. 48:119 (Nov.) 1944.

Staphylococcal bacteremia secondary to a toe infection in a 20 year old white female failed to yield to sulfadiazine (690 gr. administered over a 4-day period), but responded to a total dosage of 2,250,000 O.U. of penicillin started intravenously and continued intramuscularly until temperature had been normal for one week.

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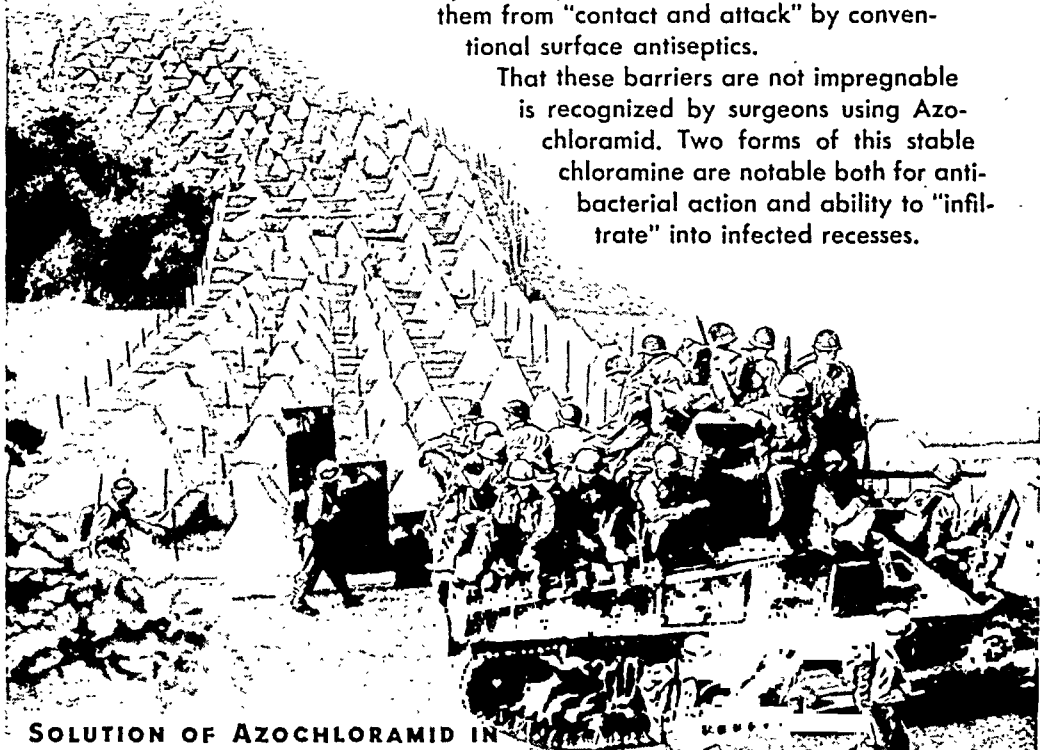
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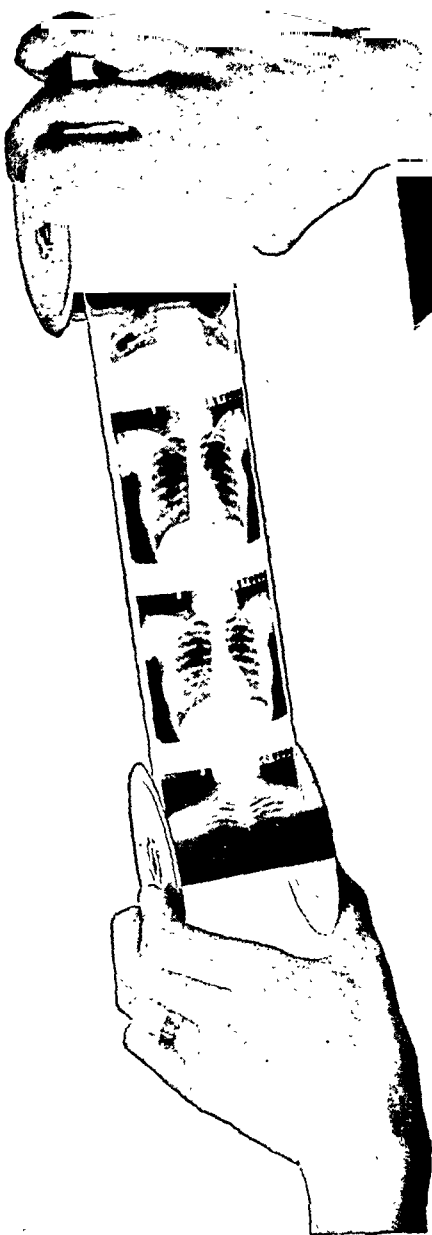
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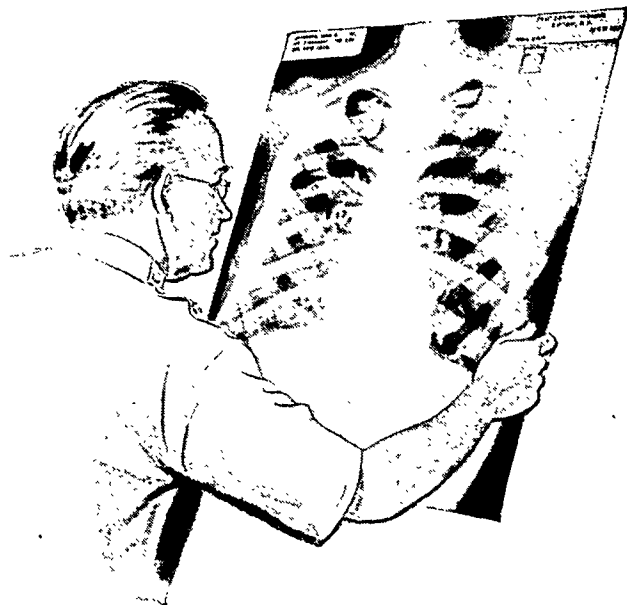
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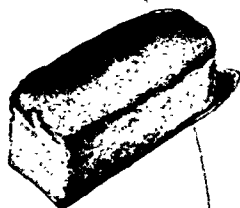
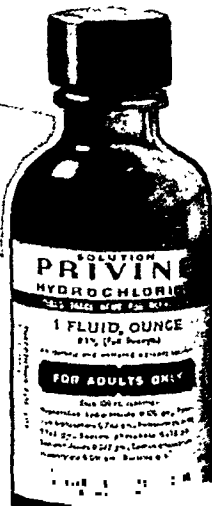


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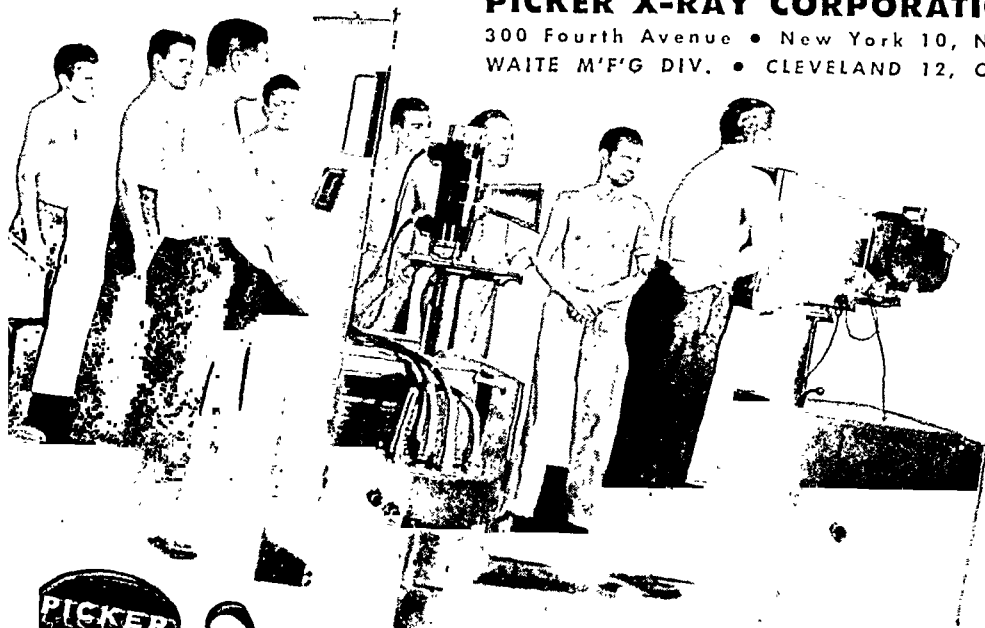
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DISEASES of the CHEST

VOLUME XI

JULY-AUGUST, 1945

NUMBER 4

INTRODUCTION

Symposium on Tuberculosis in Institutions*

OTTO C. SCHLACK, M.D., F.C.C.P.**

Oak Forest, Illinois

Institutions, large and small, offer a fertile field for the finding of open and healed tuberculosis. The term "institution" is applied to industries; schools; prisons; general, mental and other hospitals.

The symposium to be presented on this program tonight will deal with tuberculosis in institutions for the mentally ill, prisons, colleges and universities, and the Veterans Administration. Each speaker appearing on this program has had extensive experience in the institutions to be covered in the symposium.

Dr. Chester A. Stewart has made a number of valuable contributions in tuberculosis in children. His remarks are always timely and interesting. I am sure that you will find them so tonight.

Dr. Herbert A. Burns will tell us how the state of Minnesota is handling the tuberculosis problems in its institutions for the mentally ill. Dr. Otto L. Bettag will discuss tuberculosis in prisons and he will tell us of his experiences at the penal institution in Pontiac, Illinois. Dr. Ruth A. Boynton has done a great deal of work with the Student's Health Service and she will tell us of the progress made in finding tuberculosis in our colleges and universities.

Colonel Roy A. Wolford, the Governor of the College for the Veterans Administration, will talk to us on the care of the tuberculous veteran. Certainly, the veteran is entitled to the best medical care which can be obtained in the treatment of tuberculosis and steps should be taken to attract competent chest specialists to the Veterans Administration. These physicians should be placed in a position to practice their specialty unhampered by political or other outside interferences. Only through such an arrangement can the veteran be assured of the proper care in the treatment of tuberculosis. Colonel Wolford will tell us of what is being done in the Veterans Administration to care for our tuberculous veterans.

In all institutions there should be a chest physician employed on a full time basis or where this is not feasible, arrangements should be made for a chest consultant. Every employee and inmate of an institution, every student in a college or university, and every employee in an industry should have the benefit of x-ray examination. These examinations should be conducted by qualified chest physicians.

*Chairman, Symposium presented at the 10th Annual Meeting of the American College of Chest Physicians, Chicago, Illinois, June 10, 1944.

**Medical Director, Cook County Tuberculosis Hospital.

Tuberculosis Control Programs

CHESTER A. STEWART, M.D.*

New Orleans, Louisiana

The control of human tuberculosis has received liberal attention particularly in recent years. An indication of the extent of this interest in the control of the disease and also of its annual fluctuations is provided by the number of listings on the subject contained in the Cumulative Quarterly Index Medicus. This comprehensive compilation of references to medical literature shows that approximately 2100 papers dealing primarily with various general measures considered to be of value in reducing tuberculosis were published between 1916 and 1942 (Chart 1). According to this source of information the number of articles concerned annually with controlling the disease increased from 11 in 1916 to 135 in 1936; and then remained at essentially this high level until 1939. Subsequently the literature on the subject declined appreciably owing doubtlessly to the influence of the second world war. Nevertheless, the control of tuberculosis was the subject of 74 articles published in 1942.

In 1925 references to the use of B.C.G. vaccine made their appearance in the Cumulative Quarterly Index Medicus (Chart 1). The number of articles dealing annually with this special method for preventing tuberculosis reached a maximum of 159 in 1929 and then declined rapidly. The attention this special preventive measure received recently is revealed by the 1390 articles that were concerned with B.C.G. vaccine between 1925 and 1942. These publications combined with those dealing with less specific control measures make a total of approximately 3500 articles written during the past few years on various measures for preventing tuberculosis.

The literature on this subject also reveals the evolution of the attack on the problem. Between 1916 and 1929 the contributions made to the control of tuberculosis by visiting and public health nurses, the Framingham health demonstration, preventoria, sanatoria, open air schools, summer camps, sleeping porches, and the eradication of bovine tuberculosis received considerable attention. The literature of more recent years shows that periodic tuberculin testing, mass x-ray surveys, the use of paper and miniature films, the examination of children, household groups, teachers, nurses,

*Director, Department of Pediatrics, Louisiana State University School of Medicine, New Orleans, Louisiana.

maids and the accreditation of counties constitute some additional ramifications of efforts designed to reduce human tuberculosis. Curiously, however, little or no mention is made of surveying the medical profession for tuberculosis.

For a period of several years the tuberculin testing and x-raying of thousands of children was perhaps the most vigorously promoted phase of our general program for controlling the disease, and the splendid attention children received as a result of this activity yielded valuable information. It focused the searchlight of investigation on what is now known as primary tuberculosis and clarified our concept of this introductory stage of the evolution of the disease. These studies disclosed the marvelous ability possessed normally by the majority of infants and children to bring primary tuberculosis under satisfactory control and demonstrated that this phase of the disease is an essentially non-contagious condition. These studies also revealed the ultimate development of the more

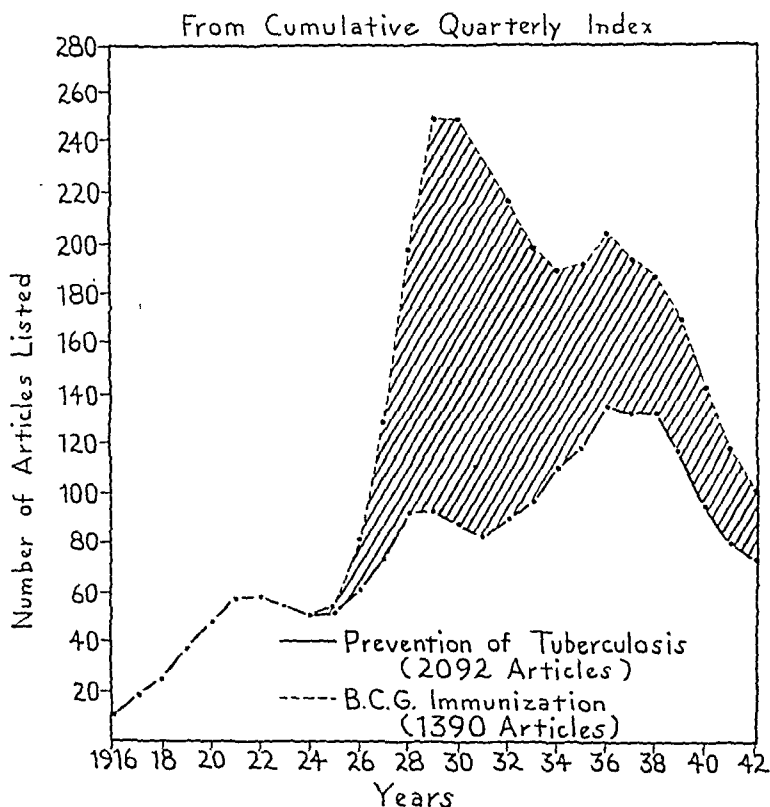


CHART 1

Number of publications dealing primarily with various measures considered to be of value in controlling tuberculosis.

serious and highly contagious reinfection form of pulmonary tuberculosis in many children whose primary disease had remained latent for months and years and observations of this character have led many investigators to doubt the validity of the commonly accepted view that an antecedent infection with tubercle bacilli augments human resistance to tuberculosis. Furthermore the studies children received demonstrated the rarity with which the highly communicable ulcerative form of pulmonary tuberculosis develops before the teen age is reached.

The recent appreciation of the fact that adults, rather than children, are chiefly responsible for the spread and perpetuation of human tuberculosis has resulted in the current trend toward focusing control programs on older age groups, one of which includes teachers and other adults employed in schools. Special incidents have emphasized the need for examining the members of this group. For example, in one instance a tuberculous teacher was discovered who was infecting the members of a High School band while instructing them in the use of wind instruments. In another instance eight members of a group of 239 teachers who were sensitive to tuberculin were found to have sputum laden with tubercle bacilli. In still another instance open tuberculosis was found in a bus driver after he had infected practically all of the 30 children he conveyed to and from school. Within a year or so six of these children were ill or dead from tuberculosis. These selected incidents demonstrate the need for controlling tuberculosis in schools. A program designed for this specific purpose has been recommended recently by the Tuberculosis Committee of the American School Health Association. The provisions of this plan are as follows:¹

1. Administer the tuberculin test to every person in the entire school system regardless of age.
2. X-ray film inspection of the chest of all adults who react to tuberculin.
3. Adequate clinical and laboratory phases of the examination of all who have shadows which might be due to tuberculosis.

In the near future the American School Health Association hopes to be in a position to award annual certificates of accreditation to schools in which communicable tuberculosis is known, on the basis of thorough surveys, to be non-existent. The ultimate objective of the Association's control program and plan of accreditation is to provide tuberculosis free schools for approximately 36 million American school children and teachers. At the present time the application of this plan is in its infancy.

Over a period of several years the Contact Infection Committee of the Academy of Pediatrics has been deeply interested in pro-

tecting children from tuberculosis not only by surveying the schools they attend but also through examining the adult members of their respective households. The program designed for this latter purpose has the approval of the Academy of Pediatrics and also of the Executive Committee of the American Trudeau Society. It contains the following provisions:²

1. Every child should be tuberculin tested at frequent intervals, and best annually, as long as he remains negative.
2. Adult family members and domestic workers should have chest x-ray films unless their tuberculin tests have been found negative. Tuberculin testing of these adults may be done by the pediatrician at the same time that the children are being tested, or preferably, whenever possible, by another physician.
3. Whenever a child is found to have a positive tuberculin reaction it is urgent that all adults closely associated with this child should have a thorough examination in an effort to find the source of infection.
4. Examination for tuberculosis of adults who have shown positive reactions should not be made by the pediatrician but by qualified specialists in this disease.
5. Open cases of tuberculosis should be segregated and removed from children until there is no longer danger of dissemination of tubercle bacilli.
6. When a case of open tuberculosis is found in a family, all children in contact with the patient who have not previously shown positive tuberculin reaction should be tested. Those who are negative at this time should be re-tested after a period of three months from the time of the last exposure.

The control programs adopted by the American School Health Association and the Academy of Pediatrics anticipate the examination of approximately forty million individuals. The task of surveying the remaining one hundred million people in the United States and of making millions of annual re-examinations is one that requires the assistance of the entire medical profession. This task challenges the American Medical Association to organize and promote a comprehensive control program designed to eradicate human tuberculosis from the United States. The ultimate attainment of this objective is contingent on placing the responsibility for detecting the disease chiefly on the private practitioners of medicine.

Until recently the diagnosis of tuberculosis was the exclusive obligation of family physicians who usually rendered this service at the nominal cost of a few office visits. Owing, however, to the crudeness of the diagnostic instruments at their disposal they seldom succeeded in recognizing the disease until it had progressed to an advanced stage of development.

The subsequent discovery of the x-ray changed this situation.

It greatly refined the diagnosis of tuberculosis and the growth of its use resulted in transferring a gradually increasing share of the responsibility for diagnosis from the family physician to the roentgenologist. The x-ray has also been employed widely by tax-supported organizations and clinics to detect tuberculosis particularly among the indigent. Thus an important third group has participated recently in the diagnosis of the disease. .

The recent perfection of photofluorography and the use of inexpensive miniature films are developments which make effective nation wide surveys feasible and practical. Already several million defense workers and members of the armed forces have received photofluorographic chest examinations in a comparatively brief period of time. The ease and rapidity with which these studies have been made leave no reason to doubt that the medical profession can complete the examination of the entire population of the United States during the course of one year and can perform all necessary re-examinations at least annually.

COMMENT

The magnitude of the task of periodically testing and x-raying one hundred thirty million people tends to discourage the launching of a comprehensive control program for the entire United States. It is helpful to recall, however, that in spite of violent opposition approximately 8000 American veterinarians applied tuberculin tests to twenty-five million cattle in 1935 and performed nearly 230 million tests between 1917 and 1942 inclusive. The reduction of bovine tuberculosis to the vanishing point accomplished by a relatively small group of veterinarians in the course of twenty-five years challenges the 150,000 licensed physicians in the United States to eradicate human tuberculosis in as equally brief period of years. The accomplishment of this objective awaits the vigorous promotion of a control program which probably should include the following steps:

1. Apply the tuberculin test routinely to all citizens regardless of their age and state of health.

(Reactions to the test identify infected individuals and provide them with visible evidence that they need x-ray studies).

2. Retest at least annually all who reacted negative to previous tests. Also test all children added each year to the population.

3. Each Medical Society should either purchase and operate or contract for the use of a photofluorographic unit.

4. Make the photofluorographic service available to all members of each medical society.

5. Charge private patients a very nominal fee for this service in order to defray its cost.

6. Obtain standard x-ray films on the occasional patient whose photofluorographic study reveals evidence of abnormal conditions in the chest.

7. Perform other clinical and laboratory studies required to complete the diagnosis.

8. Repeat the entire procedure at least annually on all patients regardless of their age and state of health.

9. Continue this program until tuberculosis is eradicated.

CONCLUSION

In conclusion the suggestion is made that the American Medical Association develop, finance, and actively promote a comprehensive program which calls for the active participation of all private practitioners of medicine in a united effort to eradicate human tuberculosis from the United States. With competent leadership 150,000 physicians should be able to conquer human tuberculosis to the same degree the American veterinarians have already conquered bovine tuberculosis. Without the leadership of the American Medical Association the day this objective is attained will be greatly delayed.

CONCLUSION

En conclusión, se sugiere a la Asociación Médica Americana que fomenta, suministre fondos y estimule activamente un plan comprensivo que urge la participación activa de todos los médicos privados en un esfuerzo unido para extirpar la tuberculosis humana en los Estados Unidos. Bajo una dirección competente 150,000 médicos deben ser capaces de dominar la tuberculosis humana en un grado tal como los veterinarios americanos han dominado ya la tuberculosis bovina. Sin la dirección de la Asociación Médica Americana se atrasará mucho el día en que se alcance este objeto.

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Tuberculosis in Institutions for the Mentally Ill

HERBERT A. BURNS, M.D., F.C.C.P.*
St. Paul, Minnesota

The control of tuberculosis among the patients in our State Hospitals in Minnesota has been given a great deal of attention over a period of years. In 1897 Dr. H. M. Bracken, then Secretary of the Minnesota State Board of Health, presented a paper entitled, "Should the Tuberculous Insane be Isolated from Other Inmates in our Asylums and Accommodations Provided in Separate and Detached Buildings?"¹

The first sanatorium building in Minnesota was provided at the School for the Feeble-Minded at Faribault. This building, constructed during 1904, cared for some thirty cases of tuberculosis occurring among this group of our institutional population. One year later a similar building was opened caring for tuberculosis cases developing among the mentally ill at the St. Peter State Hospital. It was almost three years later that the State Sanatorium was opened with a bed capacity equal to that of the two buildings already provided for the feeble-minded and insane. Five years following this, the present County Sanatorium law was approved by the State Legislature.

The State Hospitals have pioneered in many branches of preventive medicine. We, therefore, cannot concede that they are virgin soil for pioneering. They may need help, but they do not require discovery. In some instances where the general hospitals in the State seem to be reluctant to take a forward step, our State Hospitals have been accepting such changes as regular procedure over a long period of time. The routine nose and throat cultures for diphtheria and blood for Wassermann has been routine for the past twenty-five years for both employees and patients on admission. All patients and employees receive typhoid and small-pox vaccinations on admission and at intervals following. This has been routine for more than twenty years, and now, for more than ten years, all employees and patients are given the tuberculin test and roentgenograms are taken when they come to the institution. Employees are checked at three-month intervals if they are in contact with cases of tuberculosis, otherwise once each year. The same procedure, with some modification, is true for the inmates. In developing our tuberculosis program, the protection of the employees has always been of first importance. No plan can

*Chief, Tuberculosis Control Unit in Mental Hospitals, Division of Public Institutions, State of Minnesota.

be successful without first planning for the security of those who carry out the work.

The population in the State Hospitals for the Mentally Ill in Minnesota does not show monthly variations of importance. There is, however, a gradual increase in the total number of patients admitted amounting to nearly two hundred per year. New admissions coming in at the rate of 2400 per year create a housing problem which has in no way influenced the discharge of cases. Overcrowding in some areas is always occurring. The transfer of patients from a congested area to another institution where the overcrowding is less evident at the moment has been the usual method employed in caring for this problem. While this method of transfer aided in the administration of the housing problem, it also succeeded in the distribution of open cases of tuberculosis from one hospital to another.

One of the unforetold results of our contagious disease control and lengthening the period of longevity is now bearing fruit. Many of our beds primarily designed for treatable cases of mental illness are being occupied in increasing numbers by older people suffering from senile and cerebral arteriosclerotic psychosis. The admission of a large number of our older people, who, during the past few years have taken over some twenty-five per cent of our beds, has actually reduced the bed capacity of the institutions by this amount. This type of admission, with our tuberculosis control program moving in, further complicates the administration of our institutions. We have many problems to be considered that are not directly concerned in the control of tuberculosis. In failing to properly consider these various and related elements, we would only add hazards to the eventual success of the tuberculosis program itself.

Tuberculosis in the Minnesota State Hospitals, as of May 15, 1944, affects an institutional population of 14,096 mentally ill patients located in seven mental hospitals, one institution for the feeble-minded, and one colony for the epileptics. The inmate population has been fruitful soil for the interchange of the tubercle bacilli as well as the development of clinical tuberculosis among these patients. There has been very little of either therapy or control attempted. In many instances where treatment would have been given early consideration under normal conditions at home or in a sanatorium, it has been delayed here in our State Hospitals. Lack of cooperation on the part of the patient, disturbed and agitated cases, make the treatment of choice, particularly if collapse therapy is being considered, a most difficult procedure. Rest, the most important single phase of our tuberculosis therapy remains the one least desirable in the management and care of more than seventy-five per cent of our cases of mental illness.

While the psychiatrist plans activities, mental stimulation, occupations, etc., for his patient, the treatment of the one developing tuberculosis demands a reversal of the treatment originally planned for the mental illness. The patient who is self-satisfied in his own day-dreams and fantasies accepts the tuberculosis routine without remonstrance, while the disturbed case and the excited manic-depressive group can be kept reasonably quiet only with adequate help and the use of sedatives.

The psychiatrist has been fully aware of the difficulties in treating tuberculosis. He has been anxious to give priority to the care of the tuberculous in order to minimize the problem as much and as quickly as possible.

The nutrition of the patient is usually as easily managed amongst the mentally ill as in any other group. Coughing and expectoration is not as prevalent in the State Hospitals as is usually found in cases attending clinics or in sanatoria. It is apparent that the cough reflex is not stimulated except in an occasional case or where there is excessive accumulation of pulmonary discharges. Most patients swallow their sputum. It would be most difficult to get specimens of sputum coughed from the lungs in more than two or three per cent of the total known patient load now in isolation. The control of tuberculosis in this group of our population presents a problem in epidemiology that must be carried over a considerable period of time in order to make its results of permanent value.

In 1934 the inmates in institutions in Minnesota³ were surveyed by tuberculin test, x-rays, and examination of discharges. Recommendations as a result of this investigation were presented at this time and in many instances have been in part or fully followed. All new admissions since have been given the tuberculin test, and x-rays on admission have been taken. An attempt has been made since then to x-ray all patients and employees on a yearly basis. Isolation centers were established at this time or earlier and have been further developed. The present report attempts to present certain epidemiological facts, the interpretation of which must be left for comparison by similar workers in other institutional tuberculosis control programs.

There is much in both the fields of epidemiology and medical administration to be applied to this problem before we have fully succeeded in our control of tuberculosis as it affects this group of patients. The tuberculin test as applied to our new admissions and to the total population of the institutions shows a very high incidence of infection ranging from ninety to over ninety-eight per cent positive reactors.

All individuals were given 1:1000 O.T. read in seventy-two hours,

retested with 1:100 O.T. and read in seventy-two hours. The tuberculin test in our work at this time is of interest chiefly because it shows the very general tuberculosis infection as it exists in our institutional group. The number of positive reactors to tuberculin among the new admissions is higher than it is among the adults who are living in the inmates community. In our population of 14,096 patients we have more than 12,825 who have at sometime come in contact with the tubercle bacillus. The 1271 negative reactors are largely adults who have lived in a heavily infected environment for one or more years.

Unstable tuberculin reactors in this group are probably insignificant. This is a phenomenon that we have failed to observe among our cases up to this time. While our opportunity has been limited, it is probable that it does not occur often at the present time in a group of adults who have been frequently exposed to considerable quantities of tubercle bacilli. Isolation may have some influence in the future in changing a number of our positive reactors to negative.

Dahlstrom³ has shown some eleven per cent of his positive tuberculin reactors changing to negative, these largely in the younger groups with the most recent contacts. He has shown that such changes are much less liable to occur in family groups where there is an open case of tuberculosis. The implications from such conclusions are of importance to the future of our work in institutions. The problem of the unstable tuberculin reactors is one which is of interest in tuberculosis therapy and prevention so far as our work is concerned. Little can be added to our knowledge as it affects this group of patients at this time even though it becomes of increasing importance in the future. We have, through isolation, further limited the element of reinfection from occurring.

The 12,825 reactors so far as we know at this time are the ones that give us our problem in tuberculosis control. Roentgenograms taken of this infected group were the most direct and quickest method of appraisal. All films were placed into one of four groups, negative, Stage I, Stage II, and Stage III, according to the Classification of the National Tuberculosis Association. The only exception was that in Group I many cases were placed who showed pleural changes or shadows indicating parenchymal change which were probably due to other than tuberculosis disease. Such diseases might be and frequently were acute respiratory infection, bronchiectasis, atelectasis, abscess, etc. All were placed in the Stage I group and called I Observation cases.

The elimination of the non-tuberculous cases was and still remains an essential part of our work. While the roentgenogram is an important part of the control equipment, the bacteriological

laboratory is really the baseline from which we work out in our control of tuberculosis. All I Observation cases must be cleared through the laboratory before being released from their I Observation status. All in this group have gastric lavage, one every three months, and, if indicated, once a month for the first three months and quarterly thereafter. Roentgenograms are taken in this group at three month intervals.

All I Observation cases whose series of gastric lavages are negative for one year or more, the x-ray showing no change compared with earlier films, are returned to the negative file while those that become positive are transferred for isolation. The negative group is given a routine x-ray once a year. Gastric lavage is repeated in any case where such procedure may become indicated. The more advanced cases Stage II and III are investigated to determine their bacteriological status. Roentgenograms are taken at intervals for comparative study. Gastric lavage may be repeated once each month for three months and if still negative, once at three month intervals thereafter. Roentgenograms are taken at three month intervals.

The final disposition of consistently negative gastric lavage cases depends upon factors involving the individuals' habits, danger to others, ability to cooperate, sanitary and isolation facilities. All these factors must be considered before these cases are taken back to the floors from which they were taken to be isolated.

The Laboratory of the State Board of Health has given us its full support in taking on the extra work entailed as a result of this program. During the past year 3742 gastric lavages and 138 sputum specimens have been examined. With the amount of laboratory work carried out during the past year and before, we now feel that the total positive group is well defined at this time. A positive culture reported upon is accepted as a case of tuberculosis, and isolation is established as quickly as possible.

There have been recorded 185 bacteriologically positive cases before January 1, 1943. During the past twelve months 315 additional and current cases have been added to this total. There are 373 positive cases in isolation at the present time.

Isolation centers have been in operation for more than ten years in some of our institutions. The changes that we have brought about recently are not beginning anything new, but rather occur in the reorganization of control methods to better fit the needs of the program as applied to the population in our nine institutions.

Isolation centers have been developed in scattered institutions leaving four without any facilities for the care of tuberculosis. Within the next two years, it is hoped that others can be added to the list of institutions that do not operate isolation quarters.

The outstanding changes in the present plan have been the reporting of all cases to the State Board of Health, depending upon the laboratory for the examination of gastric lavage specimens, the immediate transfer of positive cases to isolation centers, the development of a satisfactory contagious technique in each isolation center, and the working together with the superintendents and medical staffs of the institutions making the tuberculosis control program a very important integral part of their institutional work.

At the present time we feel that the carrier and clinical load has become defined and the search for and isolation of cases a well established routine. The results of such a program should begin to influence the incidence of both breakdown and death from tuberculosis. In our infected group we found 2509 whose roentgenograms indicated either pulmonary or pleural changes. Our tuberculosis load one year ago was:

Stage I — 2147

Stage II — 263

Stage III — 99

Four hundred thirty nine cases have been discontinued from further observation, leaving us with a working load of 2170 cases at this time.

A study of these 2509 cases was made based on repeated laboratory examination, and serial roentgenograms. The x-rays were taken over a four to ten year period usually at six months to one year intervals. In 1028 cases there were no changes in the findings; the shadows, usually apical, have remained stationary for more than two years. These patients apparently had already gone through their experience with tuberculosis. It is quite possible that these cases are no longer a serious part of our tuberculosis control problem. There were 148 cases who gave evidence of having progressive lesions at the time the study was made. During the past four years there were 222 cases whose infiltration, showing evidence of progressive disease in the beginning, has undergone very satisfactory absorption, leaving a minimal stationary residual lesion. During the early period of their infiltration, these cases would have been favorable choices for collapse therapy in sanatorium practice. I feel that collapse therapy still would have aided them in clearing and probably shortened the period of conversion from positive to negative sputum. The 1028 stationary cases do not show a tendency to reactivate. Among these cases whose tuberculosis lesions become stabilized, the tendency for it is to continue inactive. Just how much this group contributes to the future case load or to the death rate from tuberculosis cannot be determined at this time. While this group of apparently inactive tuberculosis with stationary serial roentgenograms may serve the biological

function of carrier, it does not appear that in our institutions these cases add very greatly to our case load through breakdown, or to our institutional tuberculosis death rate. This is a problem in epidemiology which can only be worked out over a period of time. The group is well controlled and is ideal material for study of the carrier phase in tuberculosis.

One of the most confusing and erroneous impressions gotten from our work is concerning our tuberculosis deaths in Minnesota. During the past ten years, according to the State Board of Health, our institutions with less than one per cent of the population, have contributed from 9.5 to 15.6 per cent of the total tuberculosis deaths occurring in the State. During the past twenty-eight months, we have had 229 tuberculosis deaths reported. So far as the roentgenogram is concerned, taken serially from the time of diagnosis to shortly before death, there were ninety-one that should not have been a charge against tuberculosis. It has been customary for all deaths occurring among our cases in isolation centers to be credited to tuberculosis. Frequently there has been little evidence of tuberculosis, certainly not enough to be recorded as a cause of death. There were twenty-eight whose tuberculosis might have been given as a contributory cause, but should not have been considered as a primary cause of death. In our cases, those becoming chronic with stationary stabilized infiltrations, tend to become more and more self-limited, and, with the increasing age of the lesion, of little danger to the future well-being of the host. Only as they remain carriers of the tubercle bacilli do they play an important part in our tuberculosis control program.

Of the 110 fatal cases in which the roentgenogram showed extensive active disease, there were sixty-three whose disease developed from an initial infiltration and continued to be an acute progressive tuberculosis up to the time of death. In eight deaths there was evidence of an older infiltration. Whether this relationship was more than coincidental cannot be determined. In thirty-nine deaths, the data was insufficient to determine the early relationship of the initial lesion to the progressive lesion which later became the cause of death. There does not seem to be any relationship between the roentgenographic findings and the incidence of positive gastric lavage. There were 449 positive gastric lavage cases whose roentgenograms were reviewed, 396 of whom showed stationary lesions for a period of two years or more. They showed shadows indicating minimal calcified or fibrotic lesions with no evidence of recent or active tuberculosis. These remain in isolation because of their positive bacteriological findings, both gastric lavage and x-rays being taken at six month intervals, or

as often as indicated. Although their carrier status may continue, later x-rays show no additional evidence of parenchymal change developing.

The finding of tubercle bacilli was associated with progressive lesions Stage I in 12 cases; Stage II, 22 cases; and Stage III, 39 cases. The tubercle bacilli carrier is not identified by any known means so far as the roentgenogram is concerned. Usually the gastric lavage specimen is the only epidemiological approach to the problem of isolation. It is apparent that the number of deaths and the number of active progressive cases, as well as the number of active cases discharging tubercle bacilli are relatively few in any one year compared to the total in the group who show evidence of parenchymal disease. The largest number of positive gastric lavage cases occurring at any one time, is not among the toxic or those showing evidence of progressive disease on the roentgenogram, but the quiescent, usually Stage I, cases whose disease has resolved to a carrier state. Just how extensive should isolation facilities be in our State Hospitals is a problem that must be worked out for each group of institutions concerned. We have now converted four per cent of our bed space for isolation purposes. This space at the present time seems adequate for our needs. We can, if the need arises, increase our isolation beds to five per cent of our capacity. It is hoped, however, that by proper screening and follow-up, with prompt isolation of positive cases, the requirements within the next two to four years will be reduced below four per cent rather than increased above this figure.

We have a considerable number of patients leaving our institutions each year through various channels, chiefly parole, discharge, and escape; there are usually some 2500 "out" patients. One of the most difficult administration elements of our program is included in this group. Superintendents of the institutions have kept records on each case. They are instructed to notify the State Board of Health at any time a patient leaves the institution. A copy of the superintendent's letter goes to the County Sanatoria, whose field service is usually prompt in checking on these absentees. To date our control of these cases is not satisfactory. It is, however, improving and we feel sure within the next few months it will be working smoothly all along the line from the State Hospital to the controlling agencies at home.

CONCLUSIONS

The State Institutions furnish a very good field for the epidemiological study of tuberculosis. The administration of the tuberculosis control program must vary with the group of institutions involved. The over-all picture of our institutional problem very

easily becomes a part of the control picture in the State as a whole. We cannot expect to improve our position in tuberculosis control statistically or epidemiologically until we get together on these reservoirs of infection that still remain among us. This is being done in Minnesota and the results will be further proof of what can be accomplished by very simple inexpensive control measures. Such measures we have found practical to be carried out under the handicap of war conditions with limited supplies of material and personnel. The results are so promising that we should not hesitate to initiate similar control programs wherever and whenever possible.

CONCLUSIONES

Las instituciones para enfermedades mentales de los Estados suministran muy buen campo para el estudio epidemiológico de la tuberculosis. La administración del plan para el control de la tuberculosis debe variar de acuerdo con el grupo de instituciones implicadas. El aspecto total de nuestro problema institucional se convierte muy fácilmente en una parte del aspecto de control en todo el Estado. No podemos abrigar esperanzas de mejorar nuestra posición en el control de la tuberculosis desde el punto de vista estadístico o epidemiológico mientras no nos pongamos de acuerdo en cuanto a estos depósitos de infección que todavía quedan entre nosotros. Se está haciendo ésto en Minnesota y los resultados darán prueba adicional de lo que se puede realizar con medidas de control muy sencillas y baratas. Hemos encontrado que es práctico llevar a cabo estas medidas a pesar de las desventajas que se presentan durante la guerra con la escasez de materiales y personal. Los resultados son tan prometedores que no debemos vacilar en iniciar programas semejantes de control dondequiera y cuandoquiera que sean posibles.

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Tuberculosis in Prisons

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HISTORY

The records of many state prisons have repeatedly reported the high incidence of tuberculosis. In some of these states today, little or nothing is done to detect or scientifically treat tuberculous inmates. There is meager medical data available in American literature and less in the foreign. Surprisingly, however, an excellent article on "Tuberculosis in Penal Institutions" was incorporated in the Congressional Record in 1904. It had many valuable suggestions such as "A compulsory law compelling the examination of every admission to any penal institution for the purpose of early detection of the disease; the construction in every state of a special hospital or sanatorium, favorably located and properly equipped for the treatment of tuberculous subjects, and the transfer of all such to this institution from the jails, penitentiaries, reformatories and prisons; provisions for out-door employment for all apparently cured cases, and the feasibility of a provision by the Federal Government for an inquiry into the status of tuberculosis in penal institutions of the United States for the purpose of gaining statistical information of value."¹

Twenty-five years later, in 1929, every state and federal prison was visited by a physician for the National Society of Penal Information. From the available statistics "about 1.1 per cent of the inmates of penal institutions were known to be affected with tuberculosis. Were physical examinations and methods more complete and searching, a larger number of cases would doubtless be recognized." The method of caring for tuberculous patients varied from separate hospital facilities to the hospitalization of only the most pronounced cases and leaving the others in their cells with the general population. Some of the tuberculosis hospitals had their greatest value in providing for the segregation of the infected inmates from the general prison population.²

The Commissioner of English Prisons, after thirty-six years of experience, wrote in 1936, "No systematic investigation into the medical aspects of crime or of prison medical administration in early times is practicable, for apparently no history of English prisons or of their administration exists."³

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Commenting on the subject of prison hospitals in 1939, the Medical Section of the American Prison Association noted that "of the 251 federal and state prisons there are at least 119 that have very inadequate medical service and show a gross neglect of the physical and mental care of their wards. In less than a dozen state prisons is adequate medical and surgical care being given to the inmates. In most cases, prisoners stand a chance of release from prison in a more deplorable state than when they were committed to incarceration."⁴

Today, 1944, based on communication with the chief executives of forty-eight states,⁵ and the federal government,⁶ there is considerable variance in detection and treatment of tuberculous inmates and the parole attitude toward them.

WHY TREAT TUBERCULOUS PRISONERS?

The communities to which the inmates return expect reformed and healthy citizens. Approximately 10 per cent of the total Illinois prison population leaves annually, and 95 per cent is destined to be released, according to recent figures from the State Department of Public Safety.⁷

Those convicted have a right to reasonable care, and this should include sickness and injuries, and inhabitation in at least average sanitation. They should not become infected with tuberculosis because of this commitment, nor should institutional employees become needlessly exposed to this disease.

A. LOCAL ADMINISTRATION

I. HOSPITAL

Building:

Prior to 1939, tuberculous patients were placed in a separate section of the General Hospital and treatment consisted of rest, food, and cod liver oil.

A central, modern tuberculosis hospital was opened October 3, 1939, at Pontiac, and a tuberculosis physician engaged. This was done on the recommendation of the Chicago Institute of Medicine, for the treatment of the tuberculous incarcerated males from the five State of Illinois penal institutions. The State Reformatory for Women, Dwight, hospitalizes its own tuberculous patients and uses medical consultation. The Vandalia State Farm, with its misdemeanor offenders, follows a similar program and is prevented by statute from transferring inmates to an Illinois penitentiary.

The hospital is a two-story, fire-proof, eighty bed capacity building with a large proportion of windows. The unit is of ward type with single rooms for post-operative and seriously ill patients.

Colored patients are kept on one side and whites on the other. In general, the positive sputum patients are placed on the second floor and the negative sputum patients on the first. A special yard adjacent to the hospital has been provided for up-patients. When the weather is inclement, cure is taken in large solaria adjoining the main wards (See Fig. 1).

X-ray:

By December 14, 1939, a modern 100 milliamperage diagnostic x-ray machine with stereoscopic and Bucky attachments was installed. Prior to this, x-ray examination within the institution was not available. Since December 8, 1941, this work has been done by inmates, as the registered technician is on military leave. The quality of the finished x-ray films has received the highest praise from a Mobile Army Examination Unit. When speed has been required, as many as eighty-five exposures of 14" x 17" films have been taken in one hour. To date, 6820 x-ray and 1251 fluoroscopic examinations have been made. All x-ray films are interpreted in detail by the physician and written reports are made. The same procedure is carried out in the fluoroscopic work (See Fig. 2).

Laboratory:

Sputa examinations are made monthly by the State Department of Public Health. At times, it becomes necessary to have sputa collections certified by the guard. All patients with converted sputa,



Figure 1: Central Tuberculosis Hospital (Pontiac Branch)

and diagnostic cases, have gastric lavage examinations. Some studies are made locally for the purposes of quicker diagnoses, teaching, etc. Tissue sections are studied by the Illinois Research Hospital Department of Pathology.

Laboratory procedures, exclusive of tissue study, should be performed by registered technicians where the patients are hospitalized.

Laundry:

Linen and blankets are autoclaved before being sent to the main laundry. Mattresses and pillows are similarly sterilized prior to being used by other patients.

Cells from which patients are received are cleaned and all linen and blankets sterilized.

Barber Care:

Barber care is furnished at the bedside through the institution barber department. The equipment is sterilized in compound creosolis before re-use on another patient.

The inmate personnel have a small barber shop within the hospital. Separate equipment is used and sterilized daily with formaldehyde fumes.



Figure 2: 100 Milliamperage Diagnostic Unit.

Radio:

Loud speakers are placed throughout the hospital but are silenced during the afternoon rest hours and from 9:00 p. m. until 9:00 a. m. Programs are selected and distributed from a central radio room. The use of bedside earphones would be more restful.

Church:

Patients with three hours sitting time and full bathroom privileges are permitted to attend the institutional weekly church services. For other patients, the services are conducted in the large wards. The institution is staffed with resident Catholic and Protestant chaplains, and permits visits by other ministers.

Movies:

Educational movies are shown at the hospital on a voluntary basis by the local Tuberculosis Association and the nearby county sanatorium. Patients with sufficient up-privileges are permitted to attend the weekly institutional movies.

Library:

Books, prior to being discarded by the institution library, are sporadically received. Considerable good could be accomplished by improvement of this situation.

Visiting:

Bed and limited up-privileged patients are permitted visitors away from the other patients but under the surveillance of an officer. The visitors wear gowns. Exercise patients go to the institutional visiting room.

We have encouraged inspection tours of the hospital by lay and medical groups. This has not been resented by the patients.

Clothes:

Inmate personnel wear white clothes on duty. Showers and change of clothing are required before returning to cells.

Officers, however, wear their uniforms home, in spite of suggestions for the institution to provide special hospital wearing apparel.

Personnel Changes:

The frequent change of officers and inmate personnel causes inefficiency and exposes more individuals to tuberculosis with its possible litigation.

Insane Patients:

Non-violent patients with active tuberculosis can be cared for

locally if special mental care is not needed. Violently insane patients and other psychotics requiring specialized attention should be treated in the mental division of the department, and chest consultation service employed.

Medical Check-ups of Personnel:

The physician, registered nurse and guards receive tri-monthly chest roentgenograms. The inmate personnel have monthly weighing and blood sedimentation rate determinations, and chest x-rays are made every three months.

Reports:

Monthly reports of each hospital patient, including admissions and discharges, are made to the Department of Public Safety. The "Diagnostic Standards and Classification of Tuberculosis" of the National Tuberculosis Association are used. All treatments, important events and personnel changes are recorded.

Annual reports with recommendations are made.

Nursing, Nutrition, and Discipline:

Because of their importance, these subjects are considered separately.

II. NURSING

The nursing staff consists of one part-time female registered nurse with special training in tuberculosis, and inmate nurses. The registered nurse is responsible directly to the physician.

A guard accompanies the registered nurse, at the suggestion of the warden. To us, the precaution seems superfluous. The patients and inmate personnel have an attitude of respect and appreciation for good nursing care.

The inmate nurses are assigned to the hospital by the placement officer on a voluntary basis. Nurses with long sentences are not permitted to work on the evening and night shifts. The local prison officials believe there is less risk of escape with such a plan. After assignment, the man is placed in the diet kitchen within the hospital. This is to familiarize him with hospital care of dishes, food, etc. He is next moved to day ward work under supervision. If he shows average intelligence, willingness to work and is reliable, he rotates first to the evening shift and then to the night shift.

The inmates are attracted to hospital work because of better and more food, access to daily showers, frequent clothing change, more recreation privileges, and fewer hours in the cellhouse. We believe extra good time should be given the nurses because of the

additional risk assumed in the constant exposure to infectious disease.

The removal of a nurse from service because of laziness, sulky attitude, etc., should be a part of his prison record and considered in his future assignments. The immediate placement in other desirable prison employment is demoralizing. The inmate should, however, be permitted to ask and receive a transfer to other employment if a justifiable explanation is given.

By merit and tenure of service a "head nurse" is chosen by the physician and registered nurse and is directly responsible to them. He has quarters in the administrative portion of the hospital and is called, as indicated, by the evening and night shifts. Several tuberculous patients have assisted with nursing as part of their tolerance exercise and ultimately were retained as regular inmate nurses.

Personal feelings enter into the handling of uncooperative patients, e.g., a bed patient who walks to the bathroom may later be denied bedside care, at the inmate nurse's discretion. Such matters are often unknown to the physician or registered nurse, as inmates have a silent code.

A recreation room is set aside for the use of the inmate personnel. A walled-off yard for exercise patients is also used by them. The large institutional play yards with their football, baseball, and basketball quarters are available. The regulation of recreation hours and the return to the cellhouse shortly after duty has improved the efficiency of hospital management.

Classes conducted for inmate nurses by the physician and registered nurse include clinical signs, treatment and nursing procedures. In spite of the lack of trained nurses, much good work has been accomplished. No cross infections have occurred either in surgery or treatments; decubital areas have happened rarely and only on debilitated and moribund patients. Oxygen has been administered in acute dyspnea from spontaneous pneumothorax, massive hemorrhage, etc., while the call for the physician was being placed.

At least one full-time nurse in charge of each shift is highly desirable. The need has been recognized by the Department of Public Safety, and recent legislation has provided for such employment.³ The present scarcity of female and male registered nurses has not permitted the approved changes.

III. NUTRITION

Institutional feeding is usually a problem. This is true in penitentiaries and especially in a penal hospital treating a chronic disease, where the grapevine system reaches perfection. The pa-

tients strongly believe good food is purchased, but that its preparation, serving, and variety are poor.

Menus, carefully prepared by trained personnel, with thought as to balanced diet as well as economy, were received for several years from a nearby sanatorium, but not followed. Special diets are a farce, regardless of the fact that diet lists are supplied to assist the kitchen. Extra nourishments have lacked fruits, malted milk and the like. Much of the mental upset of seriously ill patients is the result of their not receiving the prescribed diets. The correction of the situation is not within the authority of the physician; however, it is his responsibility to repeatedly report it. Improvements are made sporadically and often temporarily. The officer-cooks and stewards are not well trained, and they dislike preparing food which should be individualized to cases.

Permission has been received from the Director to engage a male dietitian.⁹ There are, however, only three male registered dietitians in this country.¹⁰ The solution appears to be in the engagement of a female dietitian or the "training of cooks in hospital menu planning who would be willing to cooperate in this matter." An offer to do the latter has been received from the Division of Home Economics and Nutrition of the Illinois Department of Public Welfare.¹¹

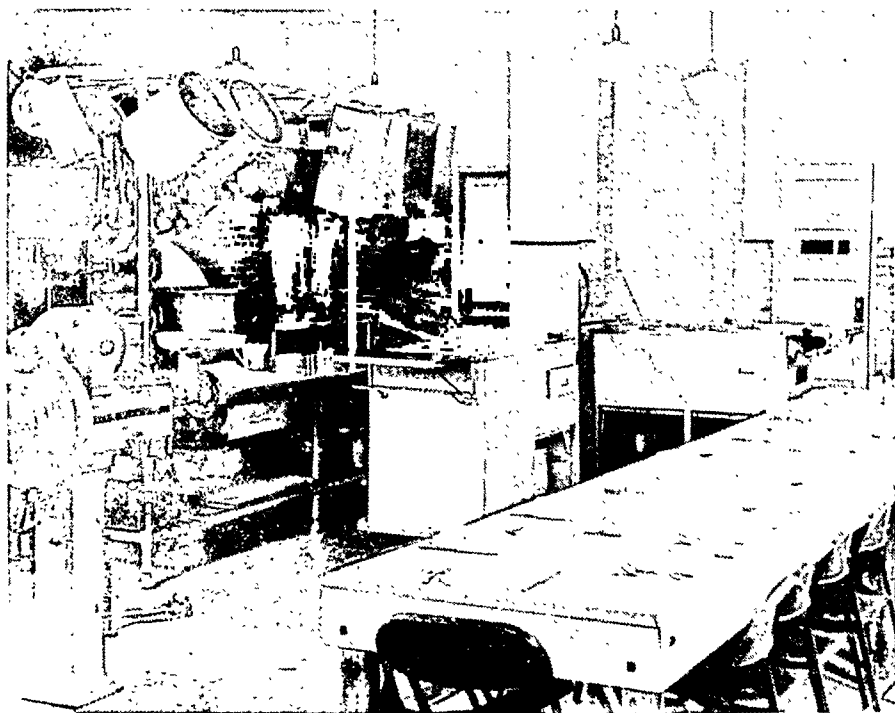


Figure 3: Central Hospital Kitchen (Note Food Conveyors)

Food is prepared in a central kitchen adjoining the General and Tuberculosis Hospitals and is served at the bedside from heated food conveyors. Originally, all meals were eaten during the eight-hour day shift. Gradually this has been spread over twelve hours. The regular diet is supplemented with forty-eight ounces of pasteurized milk and the daily requirement of vitamins A and D. The meals, in spite of the above criticism, are quite well tolerated, as evidenced by weight gains in practically all patients except the seriously ill (See Fig. 3).

Patients are asked regarding the quantity of food desired. This has decreased the garbage about fifty per cent. During the past four years the garbage has been disposed of through incineration. Prior to this it was sent to a piggery.

The inmate personnel eat in a small dining room within the hospital and are not permitted in the central kitchen except to obtain and return food conveyors. Separate dishes are used for patients and personnel. Dishes from patients are sterilized following their use, while those from the personnel are hand washed.

In most of the prisons of this country the diet for tuberculous patients is increased by the addition of milk and eggs.² In the old English prisons, the diet consisted of bread, potatoes, meat, cheese, ale and wine.³



Figure 4: Ward Patients.

IV. TREATMENT

The treatment is essentially the same as in most of the modern sanatoria. All patients are re-x-rayed every three months, have monthly sputum examinations and blood sedimentation rate determinations, and weekly weights, general condition permitting. Pneumothorax patients are masked and fluoroscoped before each refill and x-rayed monthly. Exercise patients have monthly roentgenograms and similar out-patients studies are gradually spaced, but never longer than six months.

Bed Rest:

Absolute bed rest is the most difficult therapy to administer. Enforced rest would appear to be absolute, but there are many flaws. The employment of more registered nurses and better officers should improve the situation (See Fig. 4).

Collapse Therapy:

All forms of collapse treatment are used. The patients have been most cooperative in the acceptance of these procedures. No pressure is used in persuading the patient's judgment. In addition to the consent of the patient, written permission is obtained from the nearest of kin. Two patients have refused this type of treatment: one with unilateral pneumothorax did not wish bilateral pneumothorax, another desired pneumothorax in preference to

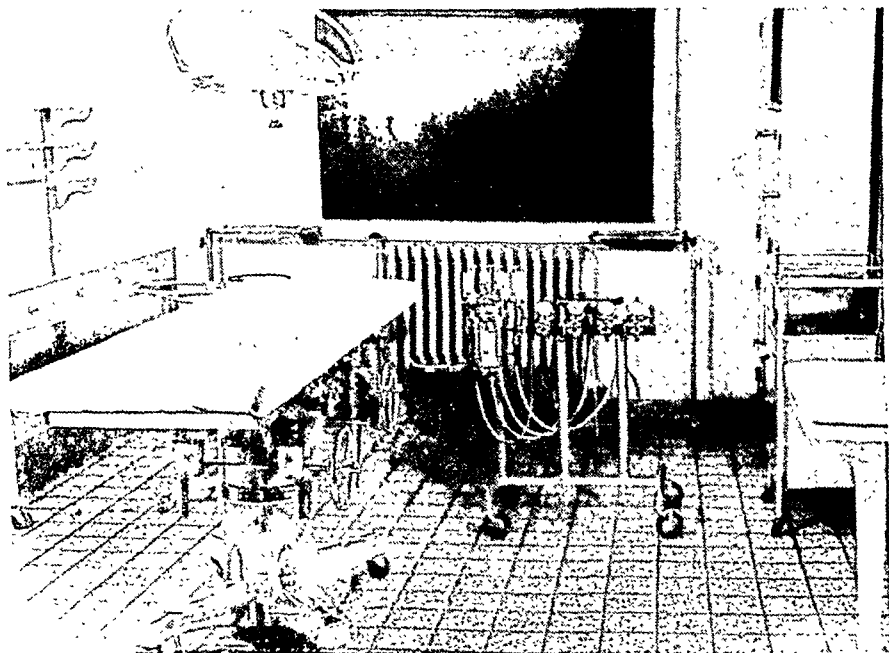


Figure 5: Operating Room with Gas Anesthesia Apparatus.

phrenic nerve paralysis. It is not unusual to receive requests from the patients for some form of surgical intervention. Forty-three per cent of all inmates hospitalized at Pontiac with active pulmonary phthisis have had collapse therapy.

Due to the lack of a competent anesthetist, all operative work was done under local anesthesia until eight months ago. We now use intravenous and the various gas anesthetics. Positive pressure is also available since we have been fortunate in obtaining the services of a well trained commuting anesthetist. Surgical assistance, for the most part, has been from the inmate nursing staff. Occasionally, physicians interested in chest diseases have rendered voluntary help. There have been no cross infections, serious accidents or surgical deaths. Black silk technique is used (See Fig. 5).

Of the patients having collapse procedures, thirty-eight per cent have had sputum converted to negative.

Treatment Statistics, October 3, 1939, to May 23, 1944:

Artificial Pneumothoraces (52 patients)	1255
Phrenicotomies	1
Phrenic Nerve Paralyzes, Temporary	19
Thoracoscopies	1
Pneumonolyses	6
Monaldi Drainages	4
Thoracoplasties, Stages (See Fig. 6)	7
Intercostal Nerve Paralyzes, Multiple	1
Thoracenteses, With or Without Lavage	47
Aspirations, Other Parts of Body	29
Laryngoscopies	1
Bronchoscopies	1
Excisions of Axillary Glands	1
Incisions and Drainages	5
Fistulectomies	1
Granulomoectomies, Perineal	4
Orchido-epididymectomies	1
Removals of Bullets from Hemithorax	1
Ultra-Violet Light, Extra-pulmonary Lesions	10046

V. DISCIPLINE

Discipline in any hospital is important and the ability to enforce it without being offensive is, at times, quite trying. These patients have previously been behavior problems while apparently well. In addition, their average education is not beyond grade school.

The necessity for treating one as an invalid, due to insidious and painless tuberculosis, is often difficult to convey.

Prisoners in the institution are under the watch of guards. The same procedure is used in the hospital. Each floor is under the supervision of officers twenty-four hours daily. Compliance with rules and privileges depends upon the strictness of the officers. During the first year, discipline was a major problem, but during the second year it became of little concern. With the resignation of an officer-in-charge who had many years of valuable penitentiary hospital experience, and the frequent placement of new officers, it has become more difficult to maintain discipline. In addition to the commotion usually experienced as the result of administration changes, there has been attraction of the more qualified personnel to better paying fields, including nearby war plants. As the officers are placed, transferred, or dismissed by the warden, their cooperation with the tuberculosis program varies directly with the attitude of the warden toward the same program.

Treatments, visiting and up-privileges, except bathroom privileges, are carried out in the regular shift between 8:00 a. m. and 4:00 p. m. This relieves the officers on the other two shifts of many details which might be misinterpreted. Educational talks and written articles have assisted the patients and officers in a better understanding of the dangers of improper treatment of this disease.

New patients, on admission, come to the physician's office for the purpose of examination, to receive an explanation of their disease, probable future treatment, and to learn of hospital conduct. An important point has been the stressing that all patients will be considered as patients and not as prisoners unless their conduct calls for it. The same procedure applies to the inmate help. An unruly or uncooperative patient may be changed to the better by his fellow patients if the physician will speak logically but loud enough for the others to hear and later reason with the offender. Practically every problem-patient has voluntarily apologized for hasty talk or action. A true feeling of forgiveness should prevail and past infractions forgotten, for the most part, in future dealings with the patient. A physician should have a sense of humor, even though at times it becomes necessary to deal sternly. Promises should be fulfilled.

Smoking, being out of bed without permission, sexual irregularities and other breaches are reportable. The first offense results in a conference between the patient and the physician with an explanation of the reasons why the patient must, for his own welfare, follow a certain routine. Placing an inmate on his honor gives him a feeling personal interest is being shown and kindness used. Contrary to popular belief, most of the inmates are polite,

considerate and optimistic. They wish to become well and to be discharged from the penitentiary. In their minds, tuberculosis is the most dreaded of the common diseases.

When conduct is repeatedly bad, a comment to this effect in the physician's report to the parole board seems justified. Likewise, a complimentary remark of good conduct is indicated. The patients should know that reference to their cooperation may be at the parole board's perusal when their case is considered. Repeated offenders are dealt with more sternly depending upon the extent of their disease. Discontinuation of up-privileges and movies, or, if necessary, isolation in a single room, serving of low caloric diet, withholding mail and the employment of a bedside commode are quite effective. Patient cliques are disbanded by separating the leaders.

Either the judgment of the physician or the inmate must be dominant. The use of solitary confinement has, therefore, been used. For exemplary reasons, apparently well patients were sent to solitary for repeated offenses and major infractions, such as fighting, insolence and threats to officers. As we eventually believed other and more humane methods to be just as effective to correct behavior problems, we discontinued the procedure of withholding food and solitary confinement. Solitary confinement is the placing of a prisoner in a darkened cell with limited food and bedding. Deadlock would appear to serve the purpose where strict immediate discipline is necessary. This is confinement to a lighted cell where there are barred doors, regular meals and bunks, but no writing or incoming mail privileges. Patients are visited daily by the physician or nurse while in solitary or deadlock. In general, no sudden weight losses have been experienced by the use of the latter procedure and, in most instances, patients have shown improvement, as the possibility of breaking rest treatment has been lessened.

In a few more serious breaches of discipline, the institution officials discontinue visiting privileges for some months and demote the individuals to lower classification grades with a loss of good time.

The present procedure in enforcing discipline is for the officer to report the offense to the disciplinarian, who, in turn, consults the physician regarding the patient's disease. This tends to relieve the physician of the stigma of being an enforcement officer.

Employment in the prison tuberculosis hospital of tuberculous civilians in arrested status would appear to have at least two advantages: the sedentary work affords an excellent opportunity for post-sanatorium patients to acclimate to normal life, and to pass on their sanatorium training to the inmates.

B. CONTROL PROGRAMS ELSEWHERE

I. OTHER ILLINOIS STATE PENITENTIARIES

This group includes the major portion of the inmate population. X-ray apparatus is lacking in one penal branch, and inadequate at two other centers. Chest films are often misinterpreted. No modern systematic detection of the possible tuberculous has been made. Sick lines are held early in the morning when tuberculous patients have their lower temperatures. Eventually, some patients are x-rayed and hospitalized.

Active cases of tuberculosis are usually permitted too many privileges and their transfers to the central tuberculosis hospital are too delayed. Apparently, avoidable disease progression has occurred because of improper rest, prolonged waiting, and unsuitable method of transfer.

The employment of a mobile photo-roentgenographic unit, central interpretation of x-rays, standardization of treatment, freer use of consultation, and quicker and more closely supervised transfers are definitely indicated.

II. STATES⁵

The problem is recognized by all states except fourteen. The latter, geographically, are four Eastern, three Central and seven Western units. The inmate population of these fourteen constitutes approximately sixteen and two-thirds per cent of the total state penal population.

Fifteen states routinely x-ray the chests of all inmates or of positive tuberculin reactors. In three states, tuberculin testing is a preliminary diagnostic procedure. Two use the Mantoux and one the Patch Test. One state routinely fluoroscopes and follows with chest plates of patients showing pathology. Twenty-five states have separate hospitalization sections of various descriptions. The first central penal tuberculosis hospital was established in New York, January 22, 1918. However, only one of their nine branches routinely employs chest x-ray examinations.

With few exceptions, the medical and surgical work is done by general prison physicians. Modern collapse therapy is seldom used. Patients, in general, may expect better care in those states referring the tuberculous to the various non-penal sanatoria. There are a few exceptions: a Southern state has a penal unit adjacent to the state sanatorium and the regular sanatorium staff treats these patients; and another commonwealth transfers patients to the Medical College Hospital for thoracoplasties and other major collapse treatments.

III. FEDERAL

The medical section of the federal penal system with its six penitentiaries is the responsibility of the United States Public Health Service. "Although the x-ray examination is the most effective diagnostic procedure, it is not routinely used because of the expense. It is ordered only when history, complaint or physical findings are suggestive of pulmonary disease."¹²

These statements are interesting in view of others in the same report, namely: "Because of crowded conditions in penal institutions unusual care must be exercised in detecting active cases, not only for the purpose of treating the afflicted individual but also for the purpose of protection of the inmate population at large. The disease is noted for its insidious onset and tendency to advance without subjective or objective symptoms."

"A special sanatorium is not available for the segregation and care of tuberculous prisoners, but all cases in need of prolonged hospital care are transferred to the Medical Center for Federal Prisoners, Springfield, Missouri."⁶

IV. OTHER NATIONS

Italy: Italy provides a special sanatorium on the Island of Pianosa for its convicted. It has one-hundred twenty beds with provisions for three-hundred sixteen beds.^{13,14}

Canada: The Dominion of Canada has an inmate population of over ten thousand in the reformatories, gaols, prisons and penitentiaries. There is no case finding or control program. They do not appear to have x-ray units in any of the major branches.¹⁵

C. PAROLE

The attitude and decisions of the Parole Board are an integral part of the control of tuberculosis. We have had splendid cooperation with our medical recommendations of cases studied by the Illinois Parole Group.

Until quite recently, it has been the policy in Illinois to retain the tuberculous inmates requiring treatment. Patients having served maximum sentence must, by law, be released. Arrangements, however, are usually made to continue with non-penal hospitalization upon release of such patients. The discharge of all other patients is at the discretion of the Parole Board.

Those with essentially hopeless tuberculosis and a very brief prognosis have extra consideration. They quite often, but not necessarily, obtain a medical parole. The relatives of these patients, however, must furnish proof of approved hospitalization. For obvious reasons, such patients and relatives prefer the exitus to occur outside of the penitentiary.

Patients believe being in the tuberculosis hospital retards their chance of parole. This can prevent an ill patient from reporting to the morning sick line, with its subsequent possible hospitalization. This is also an indication for routine x-ray examination of all inmates.

There is considerable variation in policy throughout the nation on this subject. Most of the states have no set procedure. States in which it is the practice to commute the sentence, or parole or pardon the inmate are usually those in which the problem is thought to be of minor concern or where it is of major importance but adequate hospitalization facilities are lacking. One small New England state with few inmates transfers the tuberculous to another state penal center. Several states, however, have had bad experiences with the paroled sick and, therefore, seldom grant earlier releases. This policy is usually followed where hospitalization is readily available. There are striking exceptions. In one state, with an excellent control program, the Parole Board is without jurisdiction to release a tuberculous patient if the attending physician is of the opinion the patient's condition would endanger public health. The law of that commonwealth is as follows:

"An inmate of a public charitable institution or a prisoner in a penal institution who is afflicted with syphilis, gonorrhea or pulmonary tuberculosis shall forthwith be placed under medical treatment, and if, in the opinion of the attending physician, it is necessary, he shall be isolated until danger of contagion has passed or the physician determines his isolation unnecessary. If at the expiration of his sentence he is afflicted with syphilis, gonorrhea or pulmonary tuberculosis in its infectious or contagious symptoms, or if, in the opinion of such physician as the authorities may consult, his discharge would be dangerous to public health, he shall be placed under medical treatment and cared for as provided in the institution where he has been confined, until, in the opinion of the attending physician, the said symptoms have disappeared and his discharge will not endanger the public health."¹⁶

In a few states, jail inmates with tuberculosis are transferred to the state penitentiary for treatment. Hospitalization and follow-up care is made a condition of parole in some states. Tuberculous parolees of another state on relapsing are returned to the institution and given further treatment.

In Illinois there is apparently no distinction for parole based on sex. In some of the other states, women inmates appear to receive sick paroles more readily.

The immediate medical recommendations for parolees are fulfilled. This applies to their need for future treatment, approval of the non-penal hospital, mode of transfer, and necessity of an attendant. Thereafter, we have no contact with the patients even though they are under parole for three years. Future medical

arrangements are apparently settled between the parolee and the parole agent. As long as the paroled patient is accountable to the Department of Public Safety, it would seem to be the latter's responsibility to place him under the supervision of the tuberculosis division of the Department.

D. STATISTICS

Tuberculin Test:

Full dose second strength purified protein derivative tuberculin was given 3,113 inmates with 76 per cent positive reactors. When considered by race, 85 per cent of the colored and 73 per cent of the white reacted positively. A thousand records were selected, based on length of incarceration, and divided into two groups. Of the 500 in prison less than three months, 51 per cent had positive

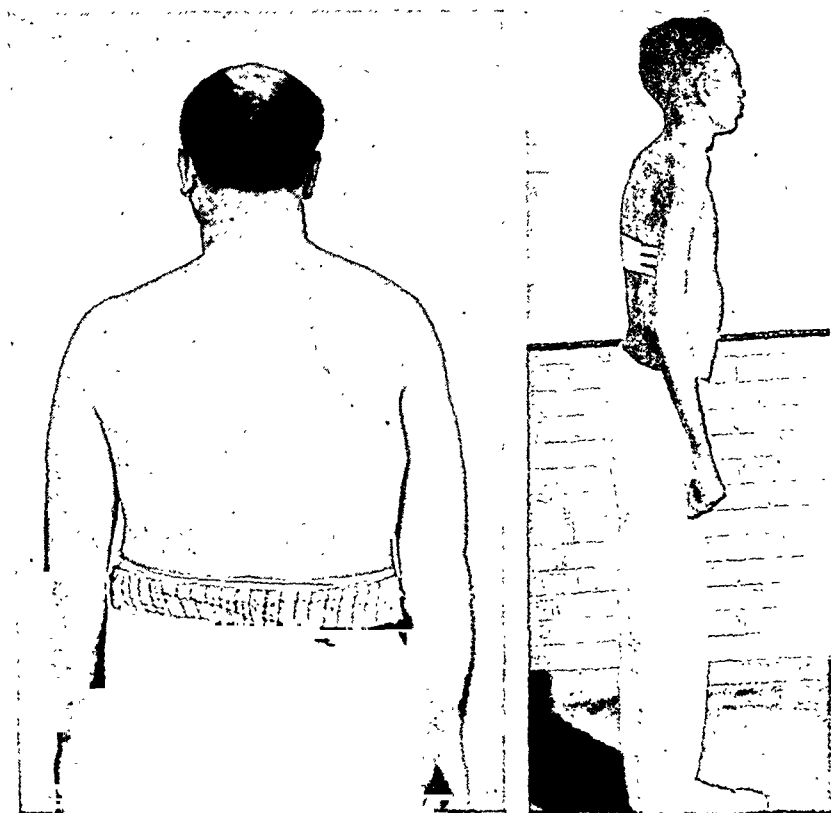


Figure 6

Figure 7

Figure 6: Seven Rib Thoracoplasty (Local Anesthesia).—Figure 7: Acute Tuberculous Pleurisy and Peritonitis. (Found on Tuberculin-X-ray survey. Did not report to sick line).

tuberculin; of the 500 retained over eighteen months, 89 per cent were tuberculin positive. Two-hundred thirteen officers were similarly examined and 81 per cent gave positive readings (See Fig. 7).

Incidence:

The positive reactors of 3,113 tuberculin tested inmates had 14" x 17" x-ray examinations of the chest. Seventy-two or 2.3 per cent had significant chest opacities. Slight thickenings of the pleura were noted, but are not a part of this report. Twenty-eight (26 pulmonary, 2 pleural), or 0.89 per cent active cases of tuberculosis were diagnosed. This is a morbidity rate of 899 per 100,000, or *seven times greater* than for the State of Illinois (See Fig. 8).

Figure 8
TUBERCULOSIS MORBIDITY RATE PER 100,000

Illinois	████████	114
East St. Louis	████████	116
Chicago	████████	167.5
Illinois Penal Institution, Pontiac Branch	██	899

None of the 213 officers had active pulmonary tuberculosis, although ten had findings ranging from suspicious to apparently cured far advanced pulmonary tuberculosis.

Admissions:

Two-hundred thirteen patients, 41 per cent white and 59 per cent colored, have been admitted. The average percentage of white and colored in the general inmate population is 70 per cent and 30 per cent respectively.

The annual entrances varied as follows:

From	10-3-39 to 6-30-40	7-1-40 to 6-30-41	7-1-41 to 6-30-42	7-1-42 to 6-30-43	7-1-43 to 6-1-44	Totals
Joliet	18	14	11	11	37	91
Menard	14	7	5	6	9	41
Pontiac	29	21	13	15	11	89
Totals	61	42	29	32	57	221*

*Includes 8 re-admissions.

Analysis of the Pontiac admissions is of interest. Approximately 52 per cent (46) came from the General Hospital sick line. The other 48 per cent were the positive tuberculin x-ray (37) and Army x-ray (6) groups. Eight deaths occurred in the patients referred from the sick line and one from the other groups.

Diagnoses:

Observation Cases—No Active Pulmonary		%
Tuberculosis Found	23	10.8
Active Pulmonary Tuberculosis: Minimal	42	19.7
Mod. Advanced	40	18.77
Far Advanced	74	34.78
Pleurisy with Effusion, Probably Tuberculous	8	3.755
Lymphadenitis, Probably Tuberculous	7	3.286
Osteomyelitis, Probably Tuberculous	8	3.755
Miliary Tuberculosis, Probable	1	.468
Fibrosis, Type Undetermined	2	.939
Pneumonitis, Type Undetermined	2	.939
Bronchiectasis	1	.468
Emphysema and Bronchial Asthma	1	.468
Osteomalacia	1	.468
Arthritis	1	.468
Lymphogranuloma Perineal	1	.468
Bullet in Chest	1	.468

Discharges:

By Reason of Death	31
To Cellhouses, Active Pulmonary Tuberculosis not Found	19
To Cellhouses on Out-Patient Status, Arrested Cases	75
To Outside Sanatoria	31
Released by Expiration of Sentence	10
Returned to Psychiatric Division	3
Administrative Transfer to other Branches	2
To Joliet for Abdominal Surgery	1
Total	172





Death Rate:

A review of the death certificates from Menard, Joliet and Pontiac for the past eight years shows tuberculosis (pulmonary and non-pulmonary) accounted for 115, or 22.6 per cent of all deaths.¹⁷ If the deaths caused by non-tuberculous involvements of the lungs are included, the per cent increases to 31.6. This notation is made as x-ray facilities were not always available during this period and autopsies were not performed except in coroner's cases. There-

fore, a number of patients probably died of tuberculosis but were not so diagnosed.

For the past four and one half years there were 62 deaths from tuberculosis within the institutions, or 13.7 per year with a yearly total census of approximately ten thousand.¹⁷ This is a death rate from tuberculosis of 137 per 100,000. As many were paroled with tuberculosis in serious general condition, it is fair to assume a good share of these also succumbed to this disease. A death rate, therefore, of approximately 200 per 100,000 would be a reasonable estimate. This is nearly *five times greater* than the average death rate for Illinois (See Fig. 9).

Figure 9
TUBERCULOSIS MORTALITY RATE PER 100,000

Illinois		41.9
East St. Louis		45.9
Chicago		55.2
Illinois Penal Institutions, actual		137

From October 3, 1939, to June 1, 1944, thirty-one deaths occurred in the Tuberculosis Hospital. They are allocated as follows:

From	10-3-39 to 6-30-40	7-1-40 to 6-30-41	7-1-41 to 6-30-42	7-1-42 to 6-30-43	7-1-43 to 6-1-44	Totals
Joliet	1	6	2	3	1	13
Menard	0	5	2	1	1	9
Pontiac	3	3	2	0	1	9
Totals	4	14	6	4	3	31

The deaths are further classified by diagnoses:

Far Advanced Pulmonary Tuberculosis.....	25
Pulmonary Tuberculosis, Probable.....	1
Miliary Tuberculosis, Probable.....	1
Bilateral Pleural Effusion.....	1
Osteomyelitis	1
Pneumonia and Senility.....	1
Osteomalacia	1

Of these, 19, or 60 per cent were colored and 12, or 40 per cent were white.

The average length of hospitalization prior to death was 288 days. Classified as to institution from which patients were received: Joliet 202 days, Menard 432 days, Pontiac 106 days.

Census Table:

Deaths in Hospital	31	14.5%
Present Census	43	20.5%
Out-Patient Status (Pontiac Branch)	25	11.5%
Paroled, Discharged and/or Transferred	113	53.5%
<hr/>		<hr/>
Total Patients Admitted	212	100.0%

DISCUSSION

The survey committee of the Institute of Medicine of Chicago, in their report in 1937, stated:

"There are certain factors which make the problem simpler in prisons than it is in civil communities. In the first place, the economic and social factors are completely under control. The housing conditions, the hours of work, the length and type of recreation, the amount of sleep, and the diet can all be precisely regulated. In the second place, definite and effective steps can be taken to find the early case, and isolation and treatment can be strictly enforced. Most of the factors which handicap the work among the population at large are here eliminated."¹⁸

They suggested the following program for the prisons of Illinois:

1. Each incoming prisoner is to have a tuberculin skin test.
2. All who have positive reactions are to have x-rays.
3. Each incoming prisoner is to be questioned concerning family history of tuberculosis, previous attacks of the disease, and a history of pleurisy with effusion and cervical adenitis.
4. All those with positive x-rays are to be sub-classified into two groups: (a) Those with active lesions; (b) those with inactive or suspicious lesions.
5. All those with active lesions are to be sent to the prison tuberculosis hospital for isolation and treatment.
6. All those with inactive or suspicious lesions are to be segregated in a portion of a cellhouse close to the tuberculosis hospital where they can be partially isolated and under the close supervision of the tuberculosis specialist.
7. All those with family histories of tuberculosis or with histories of pleurisy with effusion or glands in the neck are to be kept on record and x-rayed each six months.
8. All those with negative tuberculin tests are to have the test repeated each year. This will be a test of the effectiveness of the program. Unless there are prisoners or employees with active tuberculosis which has been unrecognized, a prisoner who enters with a negative test should remain negative. A high incidence of conversions

in any prison or any portion of a prison should be an indication for an intensive investigation of that sector."

"While the foregoing system would locate the incoming cases of tuberculosis, it would not help in finding those already in the institutions or those which develop after admission. It is certain that there are many such cases and, therefore, an essential part of a tuberculosis program must be an active case-finding system among the prisoners and employees. This could be best started by x-raying everyone."

"At the present time there are less than 100 recognized cases of tuberculosis in all the institutions. Dr. Rector found that the recognized incidence in prisons throughout the country was 1.1 per cent. A conservative estimate of the actual incidence is 2 per cent."

"If this system of case-finding were inaugurated, the only remaining problem would be the early diagnosis of the cases developing during the prison term. These should be few; and a careful follow-up of prisoners with family or past histories of the disease and a liberal use of the x-ray in investigating prisoners with suspicious symptoms should be sufficient."

The survey committee recommended a central tuberculosis hospital at Pontiac for the problems of isolation and treatment and that "the physician in charge of the tuberculosis hospital and the case-finding work in all the prisons should be one with special experience and training in the modern treatment of tuberculosis." They thought: "A constant high standard of work could best be assured were he to be chosen and supervised by the faculty of the medical school of the state university." Regarding surgery of pulmonary tuberculosis, the committee believed: "A consultant should be appointed to do this work who might well be the thoracic surgeon of the state university."

The building of sanatoria or special sections for treating a preventable, communicable disease in a restricted and detained group appears to be folly unless modern means of detecting the pathology in the entire population are repeatedly used.

Over a span of years, it would be more lucrative to employ case-finding methods and isolate active cases even though modern therapy is not available. It would be better to use detection, isolation and treatment.

SUMMARY AND CONCLUSION

Inmates have a right to reasonable medical care and sanitation. Ninety-five per cent of all inmates in Illinois are eventually released.

Tuberculosis is a major health problem in many state penal institutions. There is a national trend toward its recognition and correction. Few states, however, have adequate control programs. There is a need for separate sections or hospitals to treat this disease.

The eradication and treatment should be relatively easy and simple with administrative and medical cooperation.

All personnel (guards, attendants, inmates, etc.) of the Tuberculosis Hospital should be immediately responsible to the executive physician, and indirectly to the lay administrators. The retention and removal of all hospital employees should be at the discretion of the executive physician.

At times, it is necessary to have sputum collections, temperatures, etc., certified.

At least one registered nurse should be on duty during each shift. Inmate personnel need supervision but give good service and are deserving of extra good time.

The planning, preparation and serving of food should be under the guidance of qualified personnel.

More efficient guards would lessen breaches of discipline; therefore, higher ratings for hospital guards should be considered.

Humane methods of enforcing discipline are indicated and successful.

Treatment and public health measures should be the same as in modern non-penal sanatoria.

Special psychotics should be treated in the mental division.

Forty-three per cent of our patients had collapse therapy, and in 38 per cent of these sputa were converted.

Ultra-violet light has been very beneficial in tuberculous adenitis and peritonitis.

Employees and inmates of the penal institutions should be tuberculin tested and positive reactors x-rayed. Thereafter, at least yearly examinations (tuberculin and/or x-ray) should be made.

Parole board decisions are important. If adequate care is pro-

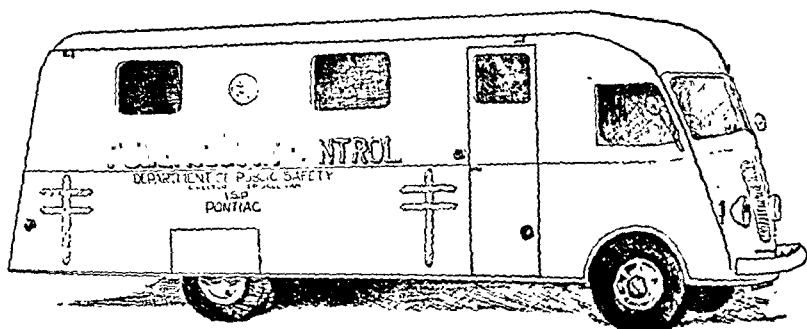


Figure 10: Sketch of Photo-roentgen Unit, bus type, ordered since presentation of paper.

vided, inmates should be treated in prison. If treatment is inadequate, sick parole should be considered. Non-penal hospitalization and/or follow-up care should be a condition of parole.

At the Pontiac Branch, 76 per cent of the inmates and 81 per cent of the officers are positive reactors and the morbidity rate of inmates for tuberculosis is 899 per 100,000. More deaths occurred in referrals from the sick lines than from the tuberculin x-ray group.

In the Illinois State Penitentiaries, the known mortality rate of inmates from tuberculosis is 137 per 100,000; the estimated mortality rate is 200 per 100,000.

Out-patients should be under central medical supervision regardless of the locale of their incarceration.

The Department should use a mobile photo-roentgenographic unit (See Fig. 10), central interpretation of x-rays, and standardize treatments and methods of transferring patients.

There is need for a national committee of physicians to study the problem of tuberculosis in prisons.

RESUMEN Y CONCLUSION

Los reclusos en penitenciarías tienen derecho a recibir atención médica e higiénica razonables. El 95 por ciento de los presos en Illinois obtienen finalmente la libertad.

La tuberculosis es un problema sanitario de mayor importancia en muchas instituciones penales de los Estados. Existe una tendencia nacional hacia el reconocimiento y corrección de este problema; pero pocos Estados cuentan con adecuados programas de control. Se necesitan secciones separadas u hospitales para tratar esta enfermedad.

La erradicación y el tratamiento serían relativamente fáciles y sencillos con la necesaria cooperación administrativa y médica.

Todo el personal del Hospital para Tuberculosos (los guardias, sirvientes, presos, etc.) debe depender directamente del médico ejecutivo, y sólo indirectamente de los administradores legos. La retención y remoción de todos los empleados del hospital debe estar a la discreción del médico ejecutivo.

Es necesario a veces certificar las colecciones de esputo, las temperaturas, etc.

Por lo menos una enfermera graduada debe estar de servicio durante cada turno. Los reclusos empleados necesitan supervigilancia pero dan buen servicio y merecen diversión extra.

El planear, preparar y servir los alimentos debe estar bajo la dirección de un personal competente.

Las infracciones de disciplina disminuirían con guardias más eficientes; por consiguiente, se deben considerar requisitos más rígidos en la selección de guardias para el hospital.

Debe emplearse métodos humanitarios para hacer observar la disciplina, y ellos dan buen éxito.

El tratamiento y las medidas de higiene pública deben ser las mismas que en sanatorios modernos no penales.

Pacientes con psicosis deben ser tratados en la división de enfermedades mentales.

El 43 por ciento de nuestros pacientes recibieron colapsoterapia, y en el 38 por ciento se obtuvo la conversión del esputo.

La luz ultravioleta ha sido muy beneficiosa en adenitis y peritonitis tuberculosas. La radioterapia en la adenitis daría resultados más satisfactorios.

Tanto los empleados de las instituciones penales como los presos deben ser probados con tuberculina, y se debe tomar radiografías de los reactores positivos. Debe repetirse los exámenes (tuberculina y/o radiografía) por lo menos una vez al año.

Las decisiones de la Junta de Libertad Condicional son importantes. Los presos deben ser tratados en la penitenciaría si obtienen allí atención adecuada, pero si el tratamiento es inadecuado debe considerarse darles libertad condicional por enfermedad. Hospitalización en una institución no penal o tratamiento subsecuente, o ambos, deben ser requisitos para obtener la libertad condicional.

En la Sección de Pontiac el 76 por ciento de los presos y el 81 por ciento de los oficiales son reactores positivos, y entre los presos la morbilidad por tuberculosis es del 899 por 100,000. Hubo más defunciones entre los que fueron referidos por sentirse enfermos que en el grupo descubierto por medio de la tuberculina y la radiografía.

En las Penitenciarías del Estado en Illinois la conocida mortalidad por tuberculosis entre los presos es del 137 por 100,000; la mortalidad estimada es del 200 por 100,000.

Los pacientes externos deben estar bajo superintendencia médica central, no importa cual sea el lugar de su encarcelación.

El Departamento debe usar un aparato foto-roentgenográfico movable, instituir la interpretación central de las radiografías y establecer uniformidad en los tratamientos y en los métodos de trasladar a los pacientes.

Se necesita un comité nacional de médicos para estudiar el problema de la tuberculosis en las penitenciarías.

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Tuberculosis in American Colleges and Universities

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Tuberculosis is recognized as one of the major health problems of the college age student. For years college health authorities have endeavored to find the tuberculous student in order to safeguard the other students in the college community. It has been a common practice in our colleges and universities to require a medical examination at the college on admission. Prior to 1928 or 1929 this examination consisted solely of the usual physical check-up. So far as the detection of tuberculosis was concerned, the examination of the chest with the stethoscope was the method used. A few cases of tuberculosis, usually moderately or far advanced, were detected by this method. Tuberculous students were sent home under the care of their own physicians, and the college felt secure that it was protecting its student body from exposure to this disease. What a false sense of security this was we now realize.

What few early papers are found on the subject of tuberculosis in college students report on the number of students breaking down with tuberculosis during their college careers. Myers¹ at the University of Minnesota, who organized the first chest clinic for college students in 1920, and Ferguson² at Western Reserve University, were among the pioneers reporting in this field. These early reports showed that the common experience was to have a student report to the Student Health Service because of a severe cough of long standing or a frank hemorrhage. The physical examination and x-ray findings, together with sputum examination, would permit a diagnosis of pulmonary tuberculosis, usually in an advanced stage. In other words, in these early days tuberculosis was diagnosed only when it produced symptoms.

Prior to 1931 there was no widespread organized effort to improve this situation. A very few institutions had started to tuberculin test their students and x-ray the reactors. The majority of colleges continued with the usual physical examination, oblivious to the fact that tuberculosis was a serious problem on the college campus, or that they were meeting this problem most inadequately.

In May of 1931 the First National Conference on College Hygiene was held at Syracuse, New York. This Conference was originally

*From the Students' Health Service, University of Minnesota, Minneapolis, Minnesota.

planned by the National Tuberculosis Association and was sponsored by the President's Committee of Fifty on College Hygiene, the American Student Health Association and the National Health Council. The purpose of the Conference was to focus the attention of college authorities on the basic health problems of college students, to secure the expert analyses of these problems, and then to formulate a statement of their conclusions with recommendations to the colleges. The Conference was attended by representatives of colleges and universities from all sections of the country, all of whom were responsible for some phase of health work in their respective institutions. Since this was a working conference, committees were appointed to consider the various phases of the health problems of college students. A Committee on Tuberculosis, under the chairmanship of the late Dr. Lee Ferguson of Western Reserve University, and of which Dr. J. Arthur Myers of the University of Minnesota and President-Elect of this organization, was a member, was one of the important committees of the Conference. This marked the first time in the history of student health work that special consideration was given to the problem of tuberculosis in college students.

This Committee made the recommendation that all colleges and universities include as a part of the physical examination of all students on admission a routine Mantoux tuberculin test and an x-ray of the chest of all tuberculin reactors. In addition, the Committee recommended that a five-year program for the study of tuberculosis in college students be arranged jointly by the National Tuberculosis Association and the American Student Health Association. Both of these organizations were much interested in this suggestion, and the American Student Health Association appointed a special Tuberculosis Committee to consider such a study. A special joint meeting of representatives of the two associations was held in the summer of 1931, and a five-year study of tuberculosis in college students was outlined. It was hoped that money might be obtained from one of the Foundations to carry on the study. However, this did not materialize. It was then suggested that the American Student Health Association, through its Tuberculosis Committee, work with the National Tuberculosis Association in the collection, analysis, and presentation of data on tuberculosis in college students and in the working out of methods for the control of tuberculosis in the colleges. A joint program of tuberculosis control has been carried out on this cooperative basis for the past 13 years. No special funds have been available for this work, but the individual colleges and universities have been stimulated to carry on the program as a part of their general health work. The National Tuberculosis Associa-

tion has given generously of the time of its staff members to aid in the collection and analysis of the data received from the various colleges, as well as in the promotion of the program through its state and local tuberculosis associations. Much of the success of the program has been due to the cooperation of the National Tuberculosis Association with the American Student Health Association.

The Tuberculosis Committee of the American Student Health Association has had three main objectives:

- (1) To formulate a suitable program for tuberculosis control in college students. This was presented to the Association in 1932 and has since been widely distributed. The essentials of this program are routine tuberculin testing and x-ray.
- (2) Through the sectional groups of the American Student Health Association to stimulate interest in tuberculosis and to bring about the adoption of definite programs for its control at all the institutions of higher education.
- (3) To collect statistics on the incidence of tuberculosis and results of tuberculin testing in college students. This was started for the school year 1932-33 and has continued each year since then.

These objectives have been carried out through the presentation of papers on tuberculosis control at the annual meetings of the American Student Health Association as well as at the sectional meetings of that organization. Statistics on the incidence of tuberculosis in college students have been obtained through questionnaires sent annually to the individual colleges and universities throughout the country. During the early years of the Committee these questionnaires were very simple, and the information received was largely as to whether the school was carrying on any special program for the detection of tuberculosis and what the nature of that program was. More recently more detailed information has been obtained about the incidence of tuberculin reactors in the schools and the number of cases of tuberculosis diagnosed each year. In 1942 Dr. C. E. Lyght,³ then chairman of the Tuberculosis Committee, reported on the first ten years of the work of his committee. The data presented to show the progress of the control of tuberculosis in colleges and universities are taken largely from the annual reports of this Committee of the American Student Health Association.⁴

The number of colleges and universities with tuberculosis case-finding programs from 1931 to 1941 is shown in the first table. When the program began in 1931 it was estimated that there were between six and ten institutions of higher education using the tuberculin test as a routine diagnostic procedure. Year by year the number has increased until in 1940-41 there were 255 colleges

TABLE I
Colleges and Universities with Tuberculosis
Case-Finding — 1931-41

Year	Number Reporting Tuberculin Testing	Number Reporting Some Tuberculosis Program
1931-32	6-10 (Est.)	
1932-33	12	
1933-34	38	
1934-35	42	
1935-36	28*	
1936-37	91	104
1937-38	116	133
1938-39	143	165
1939-40	213	248
1940-41	255	304

*Incomplete returns.

that reported routine tuberculin testing of their students and a total of 304 colleges reporting some tuberculosis program. In some institutions a routine chest x-ray of each student or a fluoroscopic examination of the chest is used without the tuberculin test.

TABLE II
Questionnaire Survey of Tuberculosis Case-Finding
in American Colleges and Universities

Year	Blanks Sent	Replies Received	Tuberculosis Program Reported
1936-37	819	233	104
1937-38	852	238	133
1938-39	857	282	165
1939-40	877	475	248
1940-41	854	483	304
1941-42	860	488	311
1942-43	879	398	267

The increasing interest and cooperation of the colleges in the tuberculosis program is shown in Table II. The number of colleges and universities replying to the questionnaires, as well as those reporting a tuberculosis program, has increased steadily during the past few years. In 1941-42, 488 institutions replied to the questionnaire, and 311 reported a tuberculosis program in progress. This latter figure represents an increase of almost 200 per cent in the last five years and includes about 40 per cent of the nation's colleges. Although the figures for 1942-43 show a slight decrease in the number of schools reporting a tuberculosis program, this, I am certain, may be explained by the depletion of medical staffs due to the war and the necessary curtailment of many phases of college health programs.

TABLE III

*Tuberculosis Case-Finding as Reported in Various Classes of
Institutions of Higher Education*

<i>Type of School</i>	<i>Schools with No Tbc. Program 1940-41</i>	<i>Schools with Some Tbc. Program 1940-41</i>
Private endowed colleges	131	118
Endowed universities	6	35
State or provincial universities	5	36
State colleges and institutes	9	35
State normal and teacher's colleges	22	70
Civic colleges and universities	6	10
Total reporting, 1940-41:	179	304

Tuberculosis case-finding programs, as reported in various types of institutions of higher education, are shown in Table III. Of 483 schools replying to the questionnaire in 1940-41, 179 reported no tuberculosis program, while 304 stated that they were carrying on some types of program. It is interesting that of all types of schools, the private endowed colleges and the civic colleges and universities are the groups having the smallest percentage of schools with a tuberculosis program. It may be true that the incidence of tuberculous infection in students attending such colleges

is lower than that for other schools. Nevertheless such schools are running the risk of admitting an occasional student with tuberculous disease, which seems unnecessary, to say the least.

TABLE IV

Enrollment of Institutions Cooperating in Tuberculosis Survey

<i>Enrollment</i>	<i>Number of Schools</i>	
	<i>1939-40</i>	<i>1940-41</i>
Less than 500 students	175	180
500 to 999 students	129	123
1,000 to 1,999 students	58	71
2,000 to 2,999 students	29	29
3,000 to 3,999 students	17	12
4,000 to 4,999 students	6	7
5,000 students and over	34	34
Enrollment not given or listed	27	27
Total schools	475	483
Total student enrollment (where reported)	680,201	689,783

TABLE V

*Tuberculin Testing of American College Students,
1932 to 1941, inclusive*

<i>Year</i>	<i>Total Number Tested</i>	<i>Per Cent Positive</i>	<i>Per Cent Men Positive</i>	<i>Per Cent Women Positive</i>
1932-33	14,318	35.0	35.0	27.0
1933-34	25,184	30.3	30.0	26.0
1934-35	26,861	29.4	30.0	27.8
1935-36	31,601	30.0	31.0	28.0
1936-37	56,224	27.3	29.4	24.8
1937-38	64,232	25.8	29.8	23.5
1938-39	82,774	25.5	27.0	24.3
1939-40	123,389	25.4	26.5	22.0
1940-41	149,744	20.7	22.8	18.5

Not only do we find various types of institutions of higher education that are cooperating in a tuberculosis survey, but also all sizes of schools. It is encouraging that small schools with a limited enrollment and, in most instances, a limited health service, find it possible to protect their students from tuberculosis as well as the larger institutions with well organized health services.

The reports on tuberculin testing indicate that slightly more than one half of the colleges are using the Purified Protein Derivative, while the remainder use Old Tuberculin for their testing. Although the committee has recommended and urged the two-dose method of tuberculin testing, some colleges still use but one dose. Over 60 per cent report the two-dose method, however.

The results of the tuberculin testing of college students are shown in Table V. The number of college students tuberculin tested has increased from less than 15,000 in 1932 to almost 150,000 in the school year 1940-41. During this same period the percentage

TABLE VI

Tuberculin Testing of College Students in 104 Colleges
(By States and Various Geographical Areas, 1941-42)

	<i>No. Tested</i>	<i>No. Positive</i>	<i>Per Cent Positive</i>
Main, New Hampshire, Connecticut, Vermont, Massachusetts, Rhode Island	3,390	1,164	34.3
New York, Pennsylvania, New Jersey, Maryland, Virginia, West Virginia	7,143	2,072	29.0
North Carolina, South Carolina, Georgia, Tennessee, Alabama, Mississippi, Florida	4,208	719	17.1
Ohio, Kentucky, Indiana, Illinois, Michigan, Wisconsin, Missouri, Minnesota, Iowa	37,665	7,230	19.4
North Dakota, South Dakota, Kansas, Idaho, Montana, Utah, Wyoming, Colorado, Nebraska	6,775	1,279	19.0
Arkansas, New Mexico, Louisiana, Oklahoma, Arizona, Texas	5,122	951	18.5
Washington, Oregon, California	8,744	2,542	29.0
TOTAL	73,047	15,957	21.8

of those students reacting to the test has decreased from 35 per cent to 20.7 per cent. This decrease in the number of students infected with tubercle bacilli is encouraging but not surprising in view of the decline in tuberculosis mortality which has occurred during this same period. In the report of the Tuberculosis Committee of the American Student Health Association for 1942-43, Dr. H. D. Lees, of the University of Pennsylvania, the present chairman of the Committee, reports that in 42,000 students tested with what was considered an adequate dosage of tuberculin, positive reactions were obtained in only 18.6 per cent. In 13 colleges of this group, less than 10 per cent of positive reactors were found among their students.

Geographical differences in the incidence of tuberculous infection as shown by the reaction to the tuberculin test are presented in Table VI. These data are based on an adequate dosage of tuberculin. The highest percentage of reactors are found on the east and west coasts, with the middle and northwest and south showing the lowest number.

Proof of the value of the tuberculosis programs in the colleges and universities of this country is shown by the number of cases of active tuberculosis found. It is an accepted fact that clinical tuberculosis can be found if it is looked for. The experiences of the colleges in diagnosing tuberculosis reaffirm this fact.

In Table VII the number of cases of tuberculosis diagnosed in those institutions with an organized tuberculosis program compared with those having no organized tuberculosis program is presented. The questionnaire and report forms sent to the college do not ask that the stage of the disease be specified for the new cases of tuberculosis. Our experience at the University of Minnesota, however, is probably typical of other schools. In our experience, approximately 90 per cent of the clinically active cases of tuberculosis are in the incipient stage. In these early stages symptoms are usually absent, and without the use of the routine tuberculin test and chest x-rays most of these cases would have been undiagnosed at this time.

For the three years for which we have figures there seems to be a decrease in the cases of active tuberculosis occurring in college students. This period is too short to state that this trend is real, although one would expect this with the decreasing percentage of tuberculin reactors. The important observation in Table VII, however, is the difference in the cases of tuberculosis per 100,000 students found in those institutions with an organized tuberculosis program compared with those that have no program. This is so striking that it should convince those responsible for the health program in any institution of the value of a modern, case-finding

TABLE VII
*New Cases of Pulmonary Tuberculosis Diagnosed
 Among College Students*

	1940-41		1941-42		1942-43	
	+	O	+	O	+	O
No. clinically active cases tbc. diagnosed	343	14	259	4	168	2
No. clinically inactive cases tbc. diagnosed	623	19	485	7	354	0
Total number new cases reported	966	33	744	11	522	2
No. students who left college because of tbc.	309	18	240	6	164	5
Number of institutions reporting	304	179	311	177	267	131
Approximate total enrollment	545,000	145,000	558,075	146,000	406,626	90,670
New cases per 100,000 students	177.2	22.7	133.5	7.53	128.3	2.21

+ = institutions with some organized tuberculosis program.

O = institutions with no organized tuberculosis program.

program and the inadequacy of attempting to diagnose tuberculosis on a basis of symptoms or ordinary physical findings. Not only is the college protecting itself and its community by this method, but is rendering a real service to the hundreds of students in whom tuberculosis is found in the early stages so that treatment can be obtained with relatively little loss of time.

SUMMARY

Tuberculosis is still one of the important health problems of the college student and is so recognized by more and more colleges and universities. The number of institutions of higher education with tuberculosis case-finding programs has increased from 6 to over 300 in the past 13 years. This increasing interest in the control of tuberculosis in college students is due in large part to the co-

operative efforts of the Tuberculosis Committee of the American Student Health Association and the National Tuberculosis Association.

The incidence of tuberculous infection in college students as shown by the tuberculin reaction has decreased from 35 per cent to approximately 20 per cent since 1931. The highest percentage of reactors was found in schools on the east and west coasts.

As a result of routine case-finding programs in the colleges, between 500 and 900 new cases of tuberculosis have been diagnosed annually during the past three years. In institutions with no organized tuberculosis programs in 1942-43 only 2.21 new cases per 100,000 students were found, compared to 128.3 in those schools making an organized effort to find tuberculosis.

The experience of the colleges in tuberculosis control provides further evidence that tuberculosis can be controlled in institutions by the application of known methods of diagnosis.

RESUMEN

La tuberculosis es todavía uno de los problemas sanitarios más importantes del estudiante de colegios superiores, y cada vez más colegios y universidades lo reconocen así. El número de instituciones de educación superior que cuentan con programas para descubrir casos de tuberculosis ha aumentado de 6 a más de 300 en los últimos 13 años. Este interés creciente en el control de la tuberculosis entre los estudiantes de colegios superiores se debe en gran parte a los esfuerzos cooperativos del Comité de Tuberculosis de la Asociación Americana de Higiene Estudiantil y de la Asociación Nacional de Tuberculosis.

La frecuencia de infección tuberculosa entre los estudiantes de colegios superiores revelada por la reacción a la tuberculina ha disminuido del 35 por ciento a aproximadamente el 20 por ciento desde 1931. Se descubrió el porcentaje más alto de reactores en las escuelas de las costas del Este y del Oeste.

Durante los últimos tres años se ha diagnosticado de 500 a 900 nuevos casos de tuberculosis al año como resultado de los programas sistemáticos de descubrimiento de casos en los colegios superiores. En las instituciones que no tienen planes anti-tuberculosos organizados se descubrieron durante 1942-43 solamente 2.21 casos nuevos por 100,000 estudiantes, comparados con 128.3 en aquellas escuelas que hicieron un esfuerzo organizado para descubrir tuberculosis.

La experiencia de las escuelas superiores en el control de la tuberculosis suministra prueba adicional de que es posible dominar la tuberculosis en instituciones, aplicando los métodos de diagnóstico ya conocidos.

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The Care of the Tuberculous Veteran*

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Washington, D. C.

With the enactment of legislation, October 6, 1917, the Federal Government recognized a responsibility for the continued hospital care and medical treatment of soldiers and sailors of the World War after their discharge from the Army and the Navy for service-incurred injury or disease.

The Sweet Bill, approved August 9, 1921, created the Veterans Bureau and charged the new agency with full authority and responsibility for all activities, including hospital care, relating to discharged veterans of the World War.

On May 1, 1922 there were transferred to the Veterans Bureau by Executive Order, all of the Veterans hospitals being operated by the United States Public Health Service. Among the institutions transferred were twelve tuberculosis hospitals, aggregating 7,168 beds. At the time of this transfer of hospitals there were ninety-five Government institutions in operation in which ex-service beneficiaries of all classifications, i.e., general medical and surgical, tuberculosis, and neuropsychiatric, were being hospitalized. In addition, it was necessary to utilize 761 civil hospitals.

The 44,591 tuberculous patients hospitalized during that year aggregated 26 per cent of all veterans treated during the twelve months' period and represented the peak annual load for this class of beneficiary. Of the approximately 10,789 tuberculous beneficiaries remaining in hospitals on the last day of June 1922, less than one-half were being cared for in Veterans hospitals; about one-third were being treated in contract hospitals and over one-sixth were hospitalized in Government hospitals, not directly under the administration of the then United States Veterans Bureau, but being operated by the Army, Navy, United States Public Health Service and the National Soldiers' Homes. Of all beneficiaries remaining in hospitals at the end of the fiscal year 1922, 43 per cent were suffering with tuberculosis.

At this period, all patients under treatment were hospitalized for service-connected disabilities. For the tuberculous beneficiaries discharged for all reasons during 1922, the average hospital stay

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was approximately seventy-six days. Over 26 per cent during that year had left the hospital through irregular discharge, that is, without the consent of the physician.

Benefits of hospitalization were extended to veterans suffering with non-service-connected tuberculosis, through an Act of June 7, 1924, approximately five and one-half years after the armistice.

While the number of cases on the compensation rolls whose major disability was tuberculosis, increased to a peak of 63,932 by the year 1933, there was a gradual decrease in the hospital load by 1934, when but 13,615 were hospitalized during the twelve months' period ending June 30th of that year.

An analysis of the principal causes of death of World War Veterans who had succumbed as a result of service and whose dependents were receiving benefits on June 30, 1933 indicated that, during the decade and a half, thirty per cent had died from tuberculosis. Considering the deaths by age group, tuberculosis had taken its heaviest toll in the group twenty to forty-nine years.

At the close of the fiscal year 1941, just prior to Pearl Harbor, the tuberculosis hospital load of the Veterans Administration was the lowest experienced. Approximately 14,681 tuberculous cases were under treatment during the twelve months' period. The tuberculosis disability of about 83 per cent of the patients was not service-connected. On June 30, 1941 there were 4,637 veterans remaining in all hospitals under treatment for tuberculosis. This represented 8 per cent of the total hospital load for all types of disability, and was a marked reduction in the percentage of tuberculous patients since June 30, 1922, when 10,789 or 43 per cent of the patients remaining in the hospital were classed as tuberculous.

During the fiscal year 1941 the average length of stay for a tuberculous patient was 188 days. Almost 90 per cent of the veterans remaining in the hospital on June 30, 1941 were beneficiaries of the first World War; peacetime veterans constituting the next larger group, or 8 per cent.

Over 15 per cent, or 53,859 of the total World War compensation service-connected active disability awards on the rolls June 30, 1941, were for tuberculosis as the major disability. Approximately 85 per cent of these awards for service-connected tuberculosis were being paid for arrested tuberculosis.

In addition, 10,135 World War I veterans were receiving pension for non-service-connected tuberculosis. Nor does this represent all of the tuberculous non-service-connected veterans in 1941, but only those whose extent of pulmonary involvement was such as to merit the adjudication of their disability as permanent and total. A veteran with a non-service-connected tuberculosis of less extent

has no entitlement to pension. As of June 30, 1941, death claims had been paid to the widows and dependents of approximately 48,330 deceased tuberculous World War veterans.

An eminent public health administrator once stated that probably the most valuable achievement of a well-conducted tuberculosis hospital in the institutional treatment of tuberculosis was the prevention of infections to the general public. He indicated the most important point in connection with the length of stay in tuberculosis hospitals is the material reduction in the general tuberculosis death rate which is effected by removing patients with active disease from their homes, thus eliminating them as sources of exposure to members of their household. If we consider this benefit, the 327,970 admissions of tuberculous patients during the twenty-two year period from 1921 to 1942 inclusive, for an average hospital stay of 185 days for each patient in our Veterans Administration Facilities, have contributed in good measure to the substantial reduction in the general tuberculosis death rate of the United States for the last two decades.

An analysis of certain statistical data and an outline of some of the factors which have influenced the tuberculosis problem of the Veterans Administration as an aftermath of the first World War, have been presented with the thought that it may afford a better understanding of the magnitude of the task which the Government must be prepared to undertake in the care of the tuberculous beneficiaries of the present world conflict.

The war-disabled promise to be more numerous as an aftermath of this war, perhaps as much as three times the number we began to serve in 1919.

There should be no unnecessary delay between the demobilization of the disabled veteran and his social and economic adjustment to the community. If further hospital treatment is indicated after discharge from the armed forces it should be made promptly available and effectively applied. With this objective in mind, the Veterans Administration has perfected arrangements with the Army, the Navy and the Coast Guard to accept for direct admission to our facilities, coincident with separation from the service, all disabled soldiers, sailors and coast guardsmen requiring further hospitalization, who are being discharged from the armed forces for disability, irrespective of the service or non-service incurrence of the disablement.

This procedure of admission of World War II tuberculous veterans, to our hospitals by direct transfer from the Service hospitals, has distinct advantages in the treatment of these individuals. These may be stated briefly, as follows: (1) a majority of the tuberculous beneficiaries remain in the hospital until treatment

is completed; (2) of those leaving against medical advice or absent without official permission, many are retained for a sufficient period of time to permit instruction in how to conduct themselves in their association with relatives and friends so as not to endanger the health of such contacts. An opportunity has been afforded to teach the tuberculous veterans to know their disease and the benefits to be derived from proper treatment, and (3) to the minority who leave our facilities by irregular discharges during the first few days after being admitted, the Federal Government has conscientiously discharged its heavy responsibility of providing adequate sanatorium care even though the beneficiary for personal reasons subsequently declines the treatment offered.

It was a cause for deep concern in the early days of the present war period when it was observed that the younger World War II veterans being admitted to our hospitals were showing the same restlessness on release from the armed forces manifested by the high percentage of discharges against the advice of the physician, or leaving without permission, as was similarly evidenced by the veterans of the prior World War in the first few years following that conflict.

In those States where the public health and welfare agencies are well organized and there is active cooperation between the Veterans Administration Facilities and these agencies, the problem of tuberculous veterans who interrupt their treatment while still communicable does not loom large.

In some areas the tuberculous veterans living at home are considered by the local public health authorities as the sole responsibility of the Veterans Administration, but actually, the control of the Veterans Administration over these veterans ceases when they leave our hospitals. However, whether suffering with a service-connected or non-service-connected tuberculosis, they are citizens of the community in which they live and the public health resources available to other tuberculous individuals in that community should likewise be extended to the veterans, and their families. Similarly, regulatory procedures commonly invoked in the cases of other infectious individuals should be applied with equal force to veterans whose tuberculous disease is of a character to constitute a public health menace.

Irregular discharges among veterans of World War II have now stabilized to the point where of all such tuberculous beneficiaries admitted to our hospitals, less than 32 per cent leave against medical advice or without the consent of the medical authorities. Of the approximately 7,200 admissions by March 30, 1944 of this group of younger veterans, over 13 per cent were readmissions and about 7 per cent were admissions by transfer from other hos-

pitals. Thus, the 7,200 admissions constituted approximately 5,760 individual veterans and of this number 2,436, or over 42 per cent were remaining under treatment.

CONCLUSION

The control of tuberculous veterans, their education to continued treatment and their ultimate rehabilitation will be just as effective, and not one jot more or less in the individual State, city or county as is the control, education and rehabilitation of other tuberculous individuals in that specific geographical area.

A campaign among medical and industrial circles as to the adaptation of tuberculous individuals in the early arrested stage of the disease to Government service and industry in general, should prove productive in the placement of many of them, both veterans and non-veterans.

A program which has for its objectives, firstly, universal public health control measures; secondly, the general extension of treatment facilities; and finally the establishment of workable rehabilitation projects, is required. It must be so planned that it will merit the effective support of the public as a whole, and administered in a manner that will assure it reaching all elements of the population.

CONCLUSION

El control de los veteranos tuberculosos, su educación para que perseveren en el tratamiento y su rehabilitación final serán tan eficaces, y ni un punto más ni menos, en cada Estado, ciudad o Condado, como lo sean el control, la educación y la rehabilitación de los otros individuos tuberculosos en la misma zona geográfica.

La campaña iniciada por círculos médicos e industriales para adaptar a individuos tuberculosos, en el período estacionado temprano de la enfermedad, a empleos en el Gobierno y la industria en general, debe resultar en la colocación de muchos de ellos, tanto veteranos como no veteranos.

Se necesita un plan que tenga por objeto: primero, medidas de salubridad pública de control universal; segundo, la extensión general de facilidades para el tratamiento; y, finalmente, el establecimiento de proyectos practicables de rehabilitación. Debe ser organizado en tal forma que merezca el apoyo efectivo de todo el público, y administrado de tal manera que esté seguro de alcanzar a todos los elementos de la población.

Socio-Economic Problems in the Rehabilitation of the Tuberculous*

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In the post sanatorium phase of tuberculosis work we are interested in retaining the gains made at the sanatorium; the patient's readjustment to the family and the community, and if possible, the return, as early as his physical condition permits, to gainful employment.

The longer the period of hospitalization and the more extensive the disease, the more difficult the readjustment. The socio-economic factors are important in the rehabilitation of patients with a reactivating disease like tuberculosis. Sir William Osler said, "Tuberculosis is a social problem with a medical aspect."

Tuberculosis is a threat to the stability of the family. Long drawn out illness, often of the wage earner, has been a severe drain on the family resources. The National Health Survey disclosed nine times as much tuberculosis in the welfare group as those with an income of \$3000 per year and over; four times as much for those in the income group of less than \$1000 as those with \$3000 or over.

To care for the patient in an institution, provide medical follow-up after discharge, and then have him live in an unsanitary or overcrowded home with insufficient income, is to invite relapse.

If we were discussing treatment, we might point out how important the social factors are in helping the patient get the most out of his cure; for with tuberculosis, a chronic, relapsing disease, we are dealing with a very complex situation in which medicine is interwoven with sociology, economics and psychology.

The man or woman with tuberculosis must be considered as,

1. A sick person to be restored to health;
2. A member of a family, sharing the family's problems and limitations;
3. A potential worker, to be restored, insofar as is possible, to his place in the community.

These aspects are not mutually exclusive but rather interdependent.

The man with tuberculosis is not only a patient in whose body

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**Committee for the Care of the Jewish Tuberculous, Inc.

a disease process is at work. He is a person who reaches for life and health. He is not only an individual, but a member of a family, and that family is part of the community. From his standpoint and that of the community, his tuberculosis is not "cured" until he and his family have been able to wipe out, insofar as it is possible, the whole vicious circle of sickness, fear and insecurity.

"There appeared in a newspaper recently a cartoon of a little boy and his mother on the way to the kindergarten, and the little boy was protesting loudly, 'I don't want to go to the kindergarten, I want to be indoctrinated. I want to be rehabilitated. I want to be retrained.'" This is from an address last December by General Frank T. Hines of the Veterans Administration. He expressed his sympathy for the mother. He spoke of maintaining our normal social institutions. "When peace comes we shall want to stop indoctrination and when retraining is accomplished, we shall want to drop that too in favor of normal social processes."

He discussed the part that social agencies can play in supplementing governmental service. "For one thing, the government deals with the veterans very largely as an individual. But the veteran is not an individual—in any exact or exclusive sense. He is a member of a family, a member of a community, a citizen of the state, a member of civic and religious organizations. He has personal relationships as a husband, father or friend. In other words, he is a part of an all-embracing social life."

The British Information Services Bulletin on Rehabilitation states that the Tomlinson Committee on Rehabilitation and Resettlement of Disabled Persons adopted the view that rehabilitation of a disabled person is not merely a medical problem, but also a social and an industrial problem. In addition therefore to advocating rehabilitation in the medical sense, it advocates special measures:

1. To bridge the gap between discharge from hospital and readiness for full time activity in employment, and
2. To overcome prejudice against the employment of disabled persons."

The English Disabled Persons Act of March 1944, covering both civilian and war disabled makes compulsory the employment of the handicapped. There is a provision for quotas to be decided after consultation between workers and employers organizations.

It calls for "special facilities for the minority whose disablement prevents them permanently, or for a substantial period from entering ordinary employment. This may be through non-profit companies or associations supplying suitable services to whom financial grants could be made."

With a reactivating disease like tuberculosis the effectiveness of

treatment may be measured in years of useful, productive life. Have we made as much progress in preserving the improved status as we have in our treatment of the disease? How many institutions know what happens to their patients the first five years following treatment?

We have been told that if the patient maintains the arrest of his disease for the five years following discharge, the chance of a relapse within the following five years is less than 4 per cent; that the danger of reactivation is greatest in the first and second year after treatment.

The Lancashire County Council (England) in a study of 4231 cases inactive for five years, and subsequently followed up, reported the number of recovered cases restored to the dispensary registry because of renewed activity was 3.8 per cent. In a series of 2488 similar cases the London County Council reported the number of cases restored to the registry was 3.9 per cent. Medical and often social care, is necessary during these years if the gains made at the sanatorium are to be retained.

The provisions for post sanatorium care have not kept pace with institutional care. "As compared with pre-sanatorium statistics, no evidence can be produced to show that the sanatorium regime by itself has increased the expectation of life. On the other hand, there is statistical evidence that the social and home conditions of the tuberculous patient and his earnings and work after discharge, noticeably influence the expectation of life. The absence of after care arrangements almost nullifies any result obtained by treatment." This is from the chapter on tuberculosis in "The Rehabilitation of the War Injured," published in 1943.

Dr. James Maxwell, in his chapter, "The Return to Freedom" (discussing period after discharge from sanatorium) says, "It cannot be too strongly emphasized that permission to live a normal life although modified in certain directions, still is not a final guarantee that the disease is arrested and that there can be no more trouble."

"The return to a normal working life should preferably be gradual—nutrition must be well kept and therefore stress must be laid upon the importance of three good meals a day. Travel to and from work often requires consideration. On the other hand, there is the danger that if the patient allows the fact of his illness to dwell too much in his mind, he may develop into a hypochondriac."

For many patients there is a real gap between the protected environment of the sanatorium and the impact of every day life as part of the family and the community. The fundamentals of treatment call for long periods of complete rest, slight exercise,

and in institutions with well regulated in-service training programs, part time planned activity. Rest is part of the regimen in which self-interest, the avoidance of conflicts and family responsibilities are always stressed as essential to successful treatment.

At home he faces the realities of every day living with all its normal physical and emotional strains. He may feel it his responsibility to again become the head of the family.

The psychiatrists tell us that most of the difficulties in social adjustment can be traced back to early experience in the home. Yet in the family we have the relationships that should make for a normal mental life. The epidemiologists tell us that many of our new cases of tuberculosis can be traced back to infection in the home. Yet a home with the normal family life provides the elements that aid in continuing the cure and in the physical and mental rehabilitation of the tuberculous.

The psychological problems in the adjustment of the patient to his family and to the community, often call for guidance, if not treatment, by the psychiatrist. While we may disagree with those who state that 90 to 100 per cent of the tuberculous require psychiatric aid, the experience in being found tuberculous, long separation from the family and the community, the very nature of the treatment in an institution, usually isolated and some distance from home, the fear of a relapse and the return to home, all are a threat to stability. Currently we are hearing a great deal about the war disabled and the importance of the acceptance of the handicapped man by the family and the community. How much more important this is with the tuberculous who still meet with an exaggerated fear of infection, plus other emotional insecurities.

We can appreciate how important it is for the family to know something about the treatment and, on discharge from the sanatorium, the patient's limitations, as well as his capacity, but it is equally important that they be given some understanding of the psychological changes.

Fear of tuberculosis may be but the outward expression of the conflict between the patient and his wife; that may be deep seated and antedate the diagnosis of disease; that perhaps has existed only in the subconscious.

We have found the psychiatrist of great help in treatment, but equally in guiding the case worker in dealing with these conflicts. Often this calls for an immoderate expenditure of time, but if successful, may be very crucial in weathering emotional disturbances that threaten the physical well being of the patient.

We have heard psychiatrists say of a patient that his relapse was but an escape from a situation he could not face.

In the early thirties a number of our Altro graduates who lost

their jobs were again compelled to apply for charitable assistance. Conditions that gave others heartaches or headaches gave them chest aches. Insecurity is a mental and physical threat to the patient and his family. The family may exert destructive influence on the patient because of emotional conflicts which arise out of his prolonged disability. The strain of long periods of dependency, added to the fear of infection, often result in social difficulties.

After sanatorium treatment the social aspects become increasingly important in their effect on the ultimate physical and industrial rehabilitation of the patient. There is a conflict between all the elements of cure—the instruction which stresses self-preservation, the need for freedom from avoidable worry, the need for mental and physical rest, and the requirements and conflicts of every day life.

To ignore the social and economic factors and all the family relationships, is to invite a relapse as surely as to have a patient with limited or uncertain work tolerance go directly from treatment in a sanatorium to full time work in industry.

Our conception of family care includes medical supervision of the patient and family, education, direction and where necessary, industrial convalescence as well as such financial assistance as may be necessary.

As in other forms of health work, the amount of money we spend may determine the effectiveness of our work. A thorough going scheme of care that carries the patient through the institution and continues during the trying years that follow, is expensive. But it is much less expensive than a program which is incomplete. Experience has taught us that tuberculosis is a long drawn out disease, costly in treatment and requiring a long period of rehabilitation. Dr. Detweiler, many years ago, said that the care of the tuberculous was a matter of character and pocketbook.

Dr. Harley Williams in "Tuberculosis in Wartime in England" in the January 1945 American Review of Tuberculosis says:

"Financial allowances recommended by Lord Davison's Special Committee, are now paid by the health authorities to all tuberculous patients who have a prospect of returning to work after treatment. These financial allowances are made on the recommendation of the tuberculosis officer after a careful assessment of the patient's clinical condition, and are in the first instance for six months but can be renewed for further periods. The only condition is that the patient must be prepared to carry out the tuberculosis officer's advice on treatment. There is no 'means test' for the standard allowance. The patient receiving these allowances is now able to carry on his cure with the minimum of worry on account of family responsibilities.

"Although the clinical methods of treating tuberculosis have improved so much during the last twenty years, more progress has still to be made in bringing the patient back into a mode of living which suits the state of his health. This process of gradual readjustment we call rehabilitation. Tuberculosis is a slow, chronic disease. It impairs will power more than most diseases, it may produce the chronic invalid who is a drain on his family and the community and often a danger to others."

In *Diseases of the Chest*, March 1944, Dr. H. I. Spector says, "Looking back into the history of the problem, one discovers that official agencies have constantly underestimated the significance of rehabilitation, and even today comparatively few public health officials recognize its importance. Thousands of dollars are spent annually to allay symptoms and to check progress of the disease, yet the importance of appropriating funds for the purpose of safeguarding patients from relapse after discharge from the sanatorium is not appreciated.

"The great number of relapses and the many deaths which occur within a relatively short time after discharge from the sanatorium, make one wonder whether much of the good work of the sanatoria and a considerable amount of public funds are not being wasted."

Dr. Fred H. Heise, President of the National Tuberculosis Association, concerned with this problem in their January 1945 bulletin said, "The people should be taught the necessity of isolation in a sanatorium and desirability of sanatorium care, and shown the need for continued care long after recovery has apparently taken place. To aid in maintaining the recovered health, living must be subsidized in many instances, patients re-educated in another trade or profession or kept on only part time work. The economic advantages of rehabilitation over care following repeated relapses must be pointed out.

"Regarding perhaps our weakest effort so far, we must show and teach that protection of the recovery from active tuberculosis is financially and socially well worthwhile. We must teach with renewed and strengthened energy, the need of maintaining adequate living standards and the economic advantages of rehabilitation."

Continuity in social care is as desirable as in medical care. Gaps in treatment or transfer from one institution to another with no regard to history or experience, are to be deplored in the social care of the tuberculous as in the medical care. We know well the dilemma of the patient who is given conflicting advice by physicians. It is equally serious and confusing if he finds social agencies failing to cooperate in a plan for his aftercare and rehabilitation.

Medical institutions find it desirable to avail themselves of previous histories, often asking for x-rays as well as reports. To what extent do we in the social care of the tuberculous make our experience available to others or try to develop a common plan where more than one agency is serving the patient at the same time?

The rehabilitation services have recognized the importance of the many social factors that affect the vocational training of the handicapped. In many states the State Rehabilitation Services have a social worker as a member of their staff. Often it is impossible for this social worker to meet the varied needs of the patient or the family. She can take advantage of existing agencies to meet the needs, and where necessary, to supplement the limited financial assistance permitted by law.

This cooperative effort will be equally important in the rehabilitation of the tuberculous veteran even though his disability be war connected. Financial assistance to meet the needs of the patient and his family are very important, and with many, pensions will meet these needs. In some instances the pensions will be inadequate and will have to be subsidized. Pensions can also be a threat, for a scheme of pensions or disability allowance that is not tied up with treatment, rehabilitation and employment, is not sound and puts a premium on invalidism.

Mrs. Helen Lee Gilbert, President, American Legion Auxiliary, said, "If there are influences that impel patients to leave hospitalization before discharge they must be overcome. Whatever decision is arrived at it must be confessed that money withheld has its influences."

We recognize the dangers involved in changing the pension laws, but believe that if it pays the patient to stay at a hospital until maximum medical improvement is attained, and on discharge there is an incentive for rehabilitation, we will have a much better experience than with the tuberculous of World War I. With some patients a scheme for withholding is not only justified but probably necessary. A program of education that stresses ethical motives, the desire to help oneself, will be sufficient with a very large number of the tuberculous veterans. Such education, as all rehabilitation, should start at the time of diagnosis.

We know the temptation to nourish a handicap when it is not to his financial interest to be rehabilitated. At the Altro Work Shop we have had experience with patients having disability insurance clauses in their policies preferring an assured \$125 a month and even less, as disabled, to the uncertainty of earnings after rehabilitation.

Much depends upon the patient himself. Some of the veteran

organizations are aware of this problem, as is the Veterans Administration itself.

The Administrator for the Veterans Administration has publicly expressed his desire to use existing private, as well as public agencies. He said, "Often when the government provides programs for the veterans, the purposes of these programs are thwarted by factors in the social situation. For instance, a veteran pursuing a course of rehabilitation or retraining may give divided attention to his work because of difficulties at home. There are important areas in a veteran's life where a government agency would be almost impotent. These areas are the province of social agencies."

The Assistant Administrator and heads of the medical and rehabilitation divisions with whom I have spoken have more than indicated their desire for this cooperation.

Dr. Kayne in "Rehabilitation of War Injured," discussing patients who present medical and social problems, says, "Three main groups we have to cater to are:

1. Those quiescent patients who need periods of industrial convalescence—that is, work under good hygienic and physical conditions and medical supervision so that arrest of the lesion can be established by the end of that period, and they can then be safely allowed to go back to ordinary industrial conditions.

2. The group of "good chronics" who need employment under sheltered conditions for the rest of their lives—that is substandard workers.

3. The group of "bad chronics" who under suitable conditions can do some work for a number of years.

Therefore the problem is to provide temporary sheltered employment and to provide permanent sheltered employment."

Mr. Michael J. Shortley, Director, Office of Vocational Rehabilitation, Federal Security Agency, in a communication to State Directors and Supervisors of Vocational Rehabilitation, dated December 6, 1944, said:

"Although in the past 23 years we have seen marked growth and advancement in the rehabilitation of the disabled, there has not been a corresponding increase in the program of services for the severely handicapped. Many private organizations throughout the country have been engaged in a variety of programs in an effort to contribute to the economic welfare of the disabled. You will agree, I am sure, that the time has come for a special program of services to the severely handicapped in terms of their needs and the facilities which should be established or improved in the United States."

There is an increasing concern with the so-called severely handi-

capped who are often by-passed in our rehabilitation services. In the tuberculosis field this would include the good chronics who usually have had years of hospitalization and treatment.

They can be found in almost every institution as well as at home. Some may require sheltered employment for the rest of their lives, but can become partially or fully self-supporting. Many such patients maintain their clinical status for years after leaving the sanatorium or go on to a complete arrest of their disease.

These patients present a greater hazard in that the relapse rate will be higher than in a more select group, but economically and socially they offer the greatest return. Instead of being prematurely condemned to the scrap heap they may enjoy many productive, useful years. There is an added public health responsibility on the part of the "good chronics" and the agency providing supervision.

A bill introduced in Congress January 3, 1945 would "provide grants to the states for assistance in the rehabilitation of disabled persons incapacitated for normal employment." This bill is "for the purpose of enabling each state to extend its service of vocational rehabilitation to disabled persons who may be made partially or wholly self-supporting through vocational training in a sheltered work project and to provide permanent employment for disabled persons who can be made partially or wholly self-supporting through sheltered facilities."

I would like to conclude my remarks with a quotation I have used before. It is from John Galsworthy's "Rehabilitation":

"Restoration is at least as much a matter of spirit as of body, and must have as its central truth, body and spirit are inextricably conjoined. To heal the one without the other is impossible.

"A niche of usefulness and self respect exists for every man however handicapped, but that niche must be found for him. To carry the process of restoration to a point short of this is to leave the cathedral without a spire. To restore him, and with him the future of our countries, that is the sacred work."

"Information Please in Medicine"*

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MEDICINE

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INTRODUCTORY REMARKS

The American College of Chest Physicians has again brought together a group of outstanding physicians, each a recognized expert in his specialty. These physicians will attempt to answer the questions which you have submitted. This program is unrehearsed and it will be patterned after the "Information Please in Medicine" program which the College presented at New York City in 1940; at Cleveland in 1941 and Atlantic City in 1942.

The first question is directed to Dr. Hinshaw:

Question: What are the results in the use of Penicillin in Pulmonary Suppurations?

Answer (Dr. Hinshaw): Theoretically penicillin has a great advantage over the sulfonamides because of the fact that it is active in the presence of necrotic material. I know of no one who has employed penicillin in the treatment of a large series of cases of pulmonary suppurative disease, but reports should appear soon. Certainly, the question of the results in lung abscess would be difficult to determine because of the fact that 25 per cent of lung abscesses may resolve spontaneously without treatment. However, in some cases a temporary dramatic response to penicillin therapy has been exhibited. In no instance have we felt that the patient has been permanently cured of chronic lung abscess by penicillin. Empyema apparently is not included in the question. In cases of empyema, however, the results apparently are superior. Reports have appeared in the literature to indicate that introducing penicillin intrapleurally early in the course of empyema has successfully eliminated infection and permitted expansion of the lung in a number of instances.

Question: What therapy do you recommend for a symptomless large cyst of one lung in a child 4 months of age?

Answer (Dr. Graham): I regard congenital cysts of the lung as being

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very dangerous. As a general rule, therefore, I think they should be removed. In my experience these cysts are very likely to become infected and when this complication has occurred nothing will cure the condition except radical removal. There is also always a danger of rupture of the cyst with a spontaneous pneumothorax which may be fatal. It is a very striking fact that one rarely sees evidence of congenital cysts after middle age. In my opinion the reason is that most patients who have this condition die before they reach middle age. That is another good reason for early radical removal.

Whether or not one should recommend the radical removal of a cyst in a baby four months old is a difficult question to answer. I think that usually it is better to wait until the child is over one year of age to perform this operation. If, however, there have already been any serious symptoms it might be desirable to operate on the baby at this early age. The danger of the effects of a spontaneous pneumothorax from the rupture of a cyst can be greatly diminished by obliterating the pleural space. This can usually be done in a very simple manner by the injection of a few cc. of the patient's blood into the pleural cavity. In the case of a baby of four months of age probably 2cc. of blood would be sufficient.

Question: The group from Mexico is interested in your opinion upon B.C.G. This procedure being in use for several years in South America and Cuba, and about to be used in Mexico for prevention of tuberculosis.

Answer (Col. Long): An experiment under the joint auspices of the United States Indian Service and the Henry Phipps Institute is in progress. Thirty-five hundred Indian children are included in the study, about equally divided between vaccinated and controls. The study is to run a number of years before definite conclusions as to the success of the method are drawn. At the end of the first five year period there were several times as many cases of tuberculosis in the unvaccinated as in the vaccinated children. On the whole the results are definitely encouraging.

Question: What are the differentiative features in the Electrocardiogram in Pulmonary Infarct and Coronary Thrombosis?

Answer (Dr. Katz): This is a pertinent question since pulmonary infarcts are more common than realized, and chest physicians should be aware of this whenever they encounter lung pathology. While pulmonary infarction occurs most often post-operatively, it is more common than generally realized at other times because of the frequency of deep vein thrombosis in the legs. In many instances the clinical episode encountered may be difficult to differentiate from a recent myocardial infarct, which is erroneously called coronary thrombosis. In ninety per cent of instances of pulmonary infarction the electrocardiogram is not characteristic and shows instability in successive records. When the pulmonary lesion is more serious and leads to acute cor pulmonale, the electrocardiogram has some of the earmarks seen in posterior wall infarction of the heart. It differs from it in several regards, however. An S wave appears in leads 1 and 2, changes unusual in posterior wall infarction. S-T in these leads is depressed and slopes up to the T wave like a New England staircase; whence, McGinnis and White of Boston have called it the "staircase" S-T.

S-T depressions of this sort are unusual in posterior wall infarcts. S-T in lead 3 is not elevated, but a Q wave and an inverted T wave are present. One is impressed by the fact that in pulmonary infarct the S-T deviation is marked in 1 and 2 and absent in 3, whereas in posterior wall infarct the S-T deviation is most marked in lead 3; furthermore, in posterior wall infarct lead 2 tends to resemble lead 3 and not lead 1. The "full blown" contour just described is not as often encountered as some of its characteristics, the commonest change being the presence of a Q_1 , T_1 . Often an intraventricular block may be temporarily present with the QRS prolonged to 0.12 second or more, and S_1 broad and prominent. Ectopic rhythms are more common than in posterior wall infarcts. The chest leads show certain characteristics in pulmonary infarction not seen in myocardial infarcts. CF_1 resembles lead 1 and sometimes this is true also of CF_4 ; however, CF_2 , unlike myocardial infarction of the posterior wall, shows an inverted T. This T inversion together with the limb lead changes make the differential diagnosis.

Far more important than the characteristics in a single record is the evolution of successive records. In infarction of the myocardium, a definite sequence lasting for three weeks to several months is found, whereas changes in pulmonary infarction are fleeting, lasting a day or two, or rarely for a week at most. The marked evolution of the waxing and waning T wave seen in infarcts of the myocardium are absent in infarcts of the lung.

No problem in differentiation is encountered between anterior wall infarcts and pulmonary infarcts.

In conclusion it seems to me that awareness of the possibility of pulmonary infarction and the tendency not to call every coronary-like electrocardiogram a recent myocardial infarction will permit the clinician to avoid the snares of diagnosis.

Question: Evaluate the different types of X-ray Films of Chest—Paper, 14 x 17 Negatives, Micro-Films, 5 x 6-35 mm.

Answer (Dr. Case): That is a question which has interested me for some time. You will all understand that in answering I am giving you my personal opinion. I have had a large experience with the paper film, and considerable, though less, experience with the photoroentgenographic films. Some of my colleagues and I have made experiments with 35 mm. and with 4 by 5 inch films and with 14 by 17 inch paper films, and with the usual 14 by 17 inch celluloid films. Some of these cases had lesions which could not be missed by 14 by 17 inch films but were shown just as clearly or 98 per cent as clearly in the paper films. I could see them on the 4 by 5 inch films with some difficulty, and on the 35 mm. they could easily have been missed. I also have seen a great many patients who have been turned down by various Army and Navy examining boards at induction stations on examinations with the 35 mm. and the 4 by 5 inch films, where the medical opinion given was based upon film interpretation. These patients have been sent to me for stereoscopic 14 by 17 inch film studies to learn the conditions present. Of course, many of them were cases of disabling pulmonary pathology, but others in my opinion should have been accepted. There were no lesions there, so far as I could see.

The paper film has to be read differently than celluloid films of any size. In a manner of speaking, paper films should not be looked

through, but *at*; it is hard to get used to looking *at* them. I still find myself trying to look *through* the paper films at times. After studying about fifty cases, I learned that these paper films must be looked *at*, not *through*. I was converted then to the use of paper films for survey purposes. I think they would also serve perfectly well for institutions specializing in tuberculosis where so much of the work is not early case finding, but for the guidance of the surgical procedure, such as in collapse therapy and so forth. The use of paper films means economy.

The Minnesota Public Health Association in its report on twenty years of observation of studying tuberculosis stated that after adequate trial x-ray films on paper base were found as satisfactory as films on celluloid base; and paper x-ray films of standard size were subsequently employed.

In my opinion the following would be a fair evaluation of the different types of x-ray films of the chest:

- (1) Stereoscopic 14 by 17 inch films.
- (2) Single 14 by 17 inch film.
- (3) Four by five inch stereoscopic photoroentgenographic films.
- (4) Paper films.
- (5) Stereoscopic 35 mm. films.
- (6) Single 4 by 5 inch photoroentgenographic films.
- (7) Single 35 mm. photoroentgenographic films.
- (8) Fluoroscopy.

Question: Please discuss the present day indications for lobectomy and pneumonectomy in the treatment of pulmonary tuberculosis.

Answer (Dr. Graham): This is a very important question at the present time. I see that Dr. Overholt is sitting right in front of the Speaker's Table. I believe his experience in this field has been greater than that of anybody else. I should prefer, therefore, Mr. Chairman, to have you call upon him to answer this question.

Answer (Dr. Overholt): Renewed interest in the resection of lungs destroyed by tuberculosis has followed as a natural sequence to the success in the treatment of suppurative disease and pulmonary malignancy by extirpation. Indications seem clear-cut in the following types of disease:

- 1) When pulmonary tuberculosis is associated with another disease such as bronchiectasis or cancer.
- 2) When what has seemed to be an adequate thoracoplasty has failed.
- 3) For tuberculoma.

Resection has also been advocated and carried out in certain other types of tuberculosis, resection being used as an alternative to thoracoplasty, in,

- 4) An extensive multilobar and predominantly unilateral tuberculosis with endobronchial disease.
- 5) Extensive unilobar disease or giant cavitation when thoracoplasty failure is anticipated.
- 6) In progressive unilobar disease with symptoms suggesting bronchial disease and pneumothorax failing.

Question: Evaluate the different Tuberculin Tests—Old Tuberculin, PPD, Patch. Which is the most accurate and standardized for school and other large surveys?

Answer (Dr. Hinshaw): I think it is rather generally agreed that the intracutaneous method of introducing tuberculin is superior to the patch method of applying tuberculin. It is obviously more certain that the material is coming in contact with the sensitized tissue. Most studies utilizing the patch test do show a high degree of accuracy but they are not yet perfect. Most physicians believe that intracutaneous injection of tuberculin is easy to do and that it is the preferred method.

Question: High School students are tested with tuberculin. One group is negative, another group is positive. Both groups are x-rayed. Films of the negative group show as many abnormal signs as those of the positive group. What does this mean?

Answer (Col. Long): If the lesions are calcified and the tuberculin test is negative, it means one of two things. Either the lesion in question is not tuberculous, or it is an old tuberculous infection so well healed that the body is no longer sensitized. We now know that other infections than tuberculosis cause pulmonary and lymph node lesions that calcify. It has been shown, also, that persons who develop tuberculous lesions that calcify are positive to tuberculin for a period, but may lose their sensitiveness if their lesions heal and they remain for some years out of contact with tuberculosis.

Question: What is the cause and significance of "egg-shell" calcifications in cases of silicosis? Do they or do they not represent the results of tuberculous infection?

Answer (Dr. Case): For this answer, I must depend on the teachings of Dr. H. C. Sweany, of Chicago. It seems well established that the so-called "egg-shell" deposits seen in the lung roots in cases of silicosis are pathognomonic of silicotuberculosis. The term "egg-shell" is employed because of the peculiar conformation of the calcific deposits.

Question: Is or is not an adenoma of the bronchus a malignant or potentially malignant tumor?

Answer (Dr. Graham): There is no doubt in my mind that an adenoma of the bronchus is a potentially malignant tumor. In 1937 Womack and I published our first paper on this subject recording six cases in which it was possible to demonstrate an invasion of the neighboring tissues and an involvement of the regional lymph glands. These are, of course, two of the important criteria of malignancy. Since that time several cases have been reported in the literature and we have had some ourselves in which metastases of distant organs have been found, notably the liver and various bones. Bloch and Adams of Chicago have reported some of these cases. It is true that often a patient will have an adenoma of the bronchus for many years without the development of malignancy. No one knows at present what factor sets off these tumors to make them suddenly take on a malignant phase but the evidence that some of them do so seems to me now to be incontrovertible. In my own opinion many of the cases of so-called round cell carcinoma and oat cell carcinoma have had their origin in a bronchial adenoma but I cannot take time to present the evidence for that opinion here.

I think it would be interesting to hear the comments of Col. Long on this subject. I hope you will call on him Mr. Chairman.

Answer (Col. Long): I would say it is a potentially malignant tumor. I believe the evidence is good that a carcinoma may develop from a tumor of this character.

Answer (Dr. Jackson): I do not believe that adenoma of the bronchus is a malignant tumor *nor do I believe that it has any inherent tendency* to become malignant. However, I would not go so far as to say that these tumors could *never* become malignant. In my opinion the impression that bronchial adenoma is typically malignant, or tends to become so, is due to confusion and error in histopathologic diagnosis; and I believe that the most important indication, in connection with the management of these cases, is better understanding and definition of its histopathology.

Question: What is your opinion as to the proper management of the pregnant tuberculous woman? Should her pregnancy be terminated prematurely? If allowed to continue, how should she be delivered? Please discuss according to stage of disease, age and parity of patient, etc.

Answer (Dr. Hinshaw): This question was answered for us this morning by a previous speaker whom all heard, I believe. There are great differences of opinion about management of the pregnant woman who has tuberculosis. Many women who have tuberculosis in latent form can go through pregnancy fairly safely and can successfully raise a family. The question of the stage of the disease and the roentgenographic appearance of the lesion deserve emphasis. After delivery the patient is in greater danger than during pregnancy. This danger may be due in part to the fact that she is disturbed frequently at night by a crying baby and there is constant domestic turmoil, but with assistance in the home the mother usually can be protected. Medical observation of a woman who has tuberculous disease is even more important following delivery than it is during the course of pregnancy.

Question: What is the pathological and clinical significance of pulmonary shadows and ring shadows following a primary inapparent coccidioidomycosis infection?

Answer (Col. Long): As you all know, coccidioidomycosis infection has become common since we have had a large turnover of troops in regions where the disease is prevalent. There have been numerous cases in California, Arizona, New Mexico and Texas.

The ring-like shadows represent thin-walled cavities. They may persist a long time and ultimately close with a small scar, without development of the granulomatous phase of the disease. In the army the cavities are considered to be a source of danger in that they may become secondarily infected. Men with such lesions are not accepted for military service. If men in the service develop cavities, however, they are not necessarily discharged, because healing not infrequently occurs promptly.

Question: How is the absence of clotting of blood in closed pleural cavity explained?

Answer (Dr. Graham): I don't think we have any very satisfactory answer to this question at the present time. A good deal of work has been done on it but I know of no satisfactory answer.

Question: Please discuss essential points in technique and value of use of diodrast in outlining the pulmonary circulation.

Answer (Dr. Case): A special concentrated solution of DIODRAST (70% aqueous solution) containing nearly 50 per cent of iodine is furnished on special requisition for this purpose. Because it may have a toxic effect, it should be employed by the intravenous method only in cases presenting special or difficult diagnostic problems where the differential diagnosis of vascular or extravascular tumor or of vascular anomaly cannot be made by any other method. It was developed primarily for cardiac and pulmonary visualization.

The medicament must be injected rapidly and in sufficient quantity so that the cardiac chambers and the intrathoracic blood vessels may become opaque to the roentgen rays during the first circulation, and one must have equipment which will permit the roentgenography to be done instantly at the time of this first circulation.

This means that one must have equipment which permits the making of four or five films of the chest in quick succession. I have not had such ideal equipment but I have used my stereoscopic film changer, rapidly unloading and reloading the film changer as the exposures were made. By having one's team of assistants rehearse in advance, six films can be made quickly but they are not spaced evenly. I remember thirty-five years ago Dr. Percy Brown had a great wheel with six compartments in it, each accommodating a film. The patient stood in front of the wheel and as the exposures were made the wheel rotated, bringing the films successively into position for exposure. This was employed for gastrointestinal work, but an apparatus of this type would be equally successful for cardioangiography.

To visualize the pulmonary vessels it is advisable to determine the ether arm-to-lung circulation time for the right chambers of the heart and the pulmonary arterial tree. The approximate time of opacification of the pulmonary arterial tree is obtained by subtracting one second from the ether circulation time. Generally the right ventricle and the pulmonary arterial tree are opacified 2.5 seconds after the start of the injection. The pulmonary veins in the left auricle show in six seconds. In pathological conditions the time of exposure may vary considerably from the values just named, and a series of films gives one a much better chance to record the pulmonary vessels than a single film made at a calculated time.

The roentgenographic technic is a little different from that required for ordinary lung films. There must be greater penetration, comparable to that employed in doing bronchography.

The posteroanterior position is ordinarily employed for the pulmonary-vascular network and lung roots, but the left lateral projection also shows the main stem of the pulmonary artery very well.

There are some contraindications to the use of DIODRAST in the concentrated solution, including hyperthyroidism, nephritis, severe disorders of the liver. It apparently has no ill effect when given to patients suffering from active tuberculosis. Patients who are in collapse or who are critically ill should not be examined.

Question: What electrocardiographic variations, if any, are produced by artificial pneumothorax, phrenic exairesis, and thoracoplasty?

Answer (Dr. Katz): I am glad that this question was raised because it gives me the opportunity of pointing out that alterations in the

electrocardiogram are produced not only by changes in the location of impulse origin, in the manner of impulse spread and by the development of currents of injury, but also by changes in the position of the heart. Alterations in the electrocardiogram are produced by these chest operations by virtue of their effect in shifting the heart's position. Artificial pneumothorax, in addition, brings air, a very poor electrical conductor, close to the heart, thereby modifying the electrical field the heart creates in the body. The variety of changes in the electrocardiogram are manifold, and no useful purpose is served by attempting to catalogue them. It is far more important to realize that when an abnormal electrocardiogram is encountered following these procedures it is to be considered the result of a shifted position of the heart and not ascribed, without further evidence, to disease of the heart. This point cannot be stressed sufficiently.

Among the changes encountered are inversions of the QRS complex, flattening or inversion of the T wave and deviations of the S-T segment. The deviations of the axis in the electrocardiogram may not coincide with the deviation of the anatomic axis of the heart. Often the two go in opposite directions because the heart not only shifts on its transverse and anteroposterior axis but rotates on its long axis as well.

When the heart becomes more pendulous, abnormalities of the P wave may appear, which, when associated with low voltage and/or right axis deviation, may suggest the pattern seen in chronic cor pulmonale. In cases seen by chest physicians it may be difficult to distinguish between a right heart strain and a positional change in the electrocardiogram. The chest physician must be careful in his diagnosis of disease of the heart from an abnormal electrocardiographic contour until he has assured himself that the changes are not due to displacement of the heart.

College News

EXECUTIVE COUNCIL AND BOARD OF REGENTS MEETINGS

The members of the Executive Council and Board of Regents of the American College of Chest Physicians held their annual meeting at the Palmer House, Chicago, Illinois, June 16-17, 1945. The meeting was attended by the following Regents and chairmen of College councils and committees:

Dr. Andrew L. Banyai, Wauwatosa, Wisconsin
Dr. Benjamin L. Brock, Waverly Hills, Kentucky
Captain Robert E. Duncan, USN, Washington, D. C.
Dr. Edward W. Hayes, Monrovia, California
Dr. Charles M. Hendricks, El Paso, Texas
Dr. Paul H. Holinger, Chicago, Illinois
Dr. William A. Hudson, Detroit, Michigan
Dr. Minas Joannides, Chicago, Illinois
Dr. Edwin R. Levine, Chicago, Illinois
Dr. C. Howard Marcy, Pittsburgh, Pennsylvania
Dr. Louis Mark, Columbus, Ohio
Dr. Jay Arthur Myers, Minneapolis, Minnesota
Dr. William E. Ogden, Toronto, Ontario, Canada
Dr. Richard H. Overholt, Brookline, Massachusetts

Dr. J. Winthrop Peabody, Washington, D. C.
Dr. Joseph C. Placak, Cleveland, Ohio
Dr. Nelson W. Strohm, Buffalo, New York
Dr. James H. Stygall, Indianapolis, Indiana
Dr. Paul A. Turner, Louisville, Kentucky

The committee reports and business transacted at the meeting will be published in the next issue of the journal.

Illinois Chapter Host to Board of Regents

The Illinois Chapter of the College gave a dinner at The Stevens Hotel, Chicago, Sunday, June 17, for the visiting members of the Board of Regents and the Chairmen of the College councils and committees. The dinner was attended by approximately fifty members of the College.

Dr. Fred M. F. Meixner, Peoria, President of the Illinois Chapter, presided at the dinner meeting and he introduced the officials of the College and the invited guests. All of the members of the Illinois Chapter who attended the dinner were also introduced by Dr. Meixner. The following past presidents of the Illinois Chapter attended the dinner meeting: Dr. Robert K. Campbell, Springfield; Dr. Otto C. Schlack, Oak Forest; and Dr. Minas Joannides, Chicago. Guests from other countries were Dr. William C. Ogden, Toronto, Regent of the College for Canada; Dr. K. C. Johnston, Winnipeg, Canada; and Dr. Adrian Pierry, Valparaiso, Chile.

TUBERCULOSIS CONTROL IN RUSSIA

The Information Bulletin of the Embassy of the Union of Soviet Socialist Republics reports that in the Ukraine, there are 196 dispensaries and wards with 3,790 beds and sanatoria with about 4,000 beds for the treatment of tuberculosis. Special country schools for children suffering from tuberculosis and homes for the adult tuberculous have been opened. Institutes engaged in the study of tuberculosis have been restored at Kiev, Kharkov, and Odessa. In addition to scientific research in clinical treatment, these institutions are helping to improve and expand the network of the institutions combatting tuberculosis in Russia.

College News Notes

Dr. Octavio Rivero Partagas, F.C.C.P., Havana, President of the Cuban Chapter of the College, has been appointed Minister of Public Health in the Cabinet of President Grau of Cuba.

Dr. Antonio Navarrete, F.C.C.P., Havana, Cuba, has been appointed to the Consejo Superior de Tuberculosis of Cuba.

Captain Robert E. Duncan, (MC) USN, F.C.C.P., Washington, D. C., Chairman of the Membership Committee of the College, has been appointed Commanding Officer of the U. S. Naval Hospital at Bethesda, Maryland.

Dr. Sidney A. Slater, F.C.C.P., Worthington, Minnesota, was honored by his alma mater, the Medical College of Virginia, at a special convocation on April 27th, when he received the degree of Doctor of Science.

Colonel A. A. Leonidoff, M.C., F.C.C.P., Poughkeepsie, New York, who is stationed in China, was appointed Professor of Practical Training in the Second Branch of the Medical College by Generalissimo Chiang Kai-Shek.

Lt. Col. Burgess L. Gordon, M.C., F.C.C.P., Philadelphia, has been appointed Chief of the Medical Service at the New U. S. Army General Hospital at Camp Pickett, Virginia. Colonel Gordon was formerly assistant to the chief of the Administration Branch, Hospital Division, Office of the Surgeon General.

Major Frank Philip Coleman, M.C., Columbia, South Carolina, has been promoted to Lieutenant Colonel.

Dr. John C. Parsons, F.C.C.P., Des Moines, Iowa, has been elected Secretary of the Iowa State Medical Society.

Dr. Willard Van Hazel, F.C.C.P., Chicago, Illinois, presented a paper entitled, "Tumors of the Chest" at the U. S. Naval Hospital, Great Lakes, Illinois, on May 15th.

Dr. Frederick Slyfield, F.C.C.P., Seattle, Washington, was chairman of the Wartime Graduate Medical Meeting held at the Baxter General Hospital, Spokane, Washington, on May 18th.

**FALL REFRESHER COURSE IN
LARYNGOLOGY, RHINOLOGY AND OTOTOLOGY
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The University of Illinois College of Medicine announces its sixth semi-annual Refresher Course in Laryngology, Rhinology and Otology, September 24th through September 29th, 1945, at the College, in Chicago. The course is intensive and largely didactic, but some clinical instruction is also provided.

It is especially suited to specialists unable to devote a longer period for advanced instruction and to others seeking a comprehensive review of the field of otorhinolaryngology. The number of registrants will be limited. It is therefore desirable to apply for registration immediately. The fee is \$50. When applying, give full details as to school and year of graduation, postgraduate training, college degrees, etc. Write to Dr. A. R. Hollender, Chairman, Refresher Course Committee, Department of Otolaryngology, University of Illinois College of Medicine, 1853 West Polk Street, Chicago 12, Illinois.

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Through the cooperation of Mead Johnson & Company, \$34,000 in War Bonds are being offered to physician-artists (both in civilian and in military service) for art works best illustrating the above title.

This contest is open to members of the American Physicians Art Association. For full details, write Dr. F. H. Redewill, Secretary, Flood Building, San Francisco, Cal., or Mead Johnson & Co., Evansville 21, Indiana.

—Reader Notice.

Books, Reprints and Reports Received

Reprints:

- Resumen del Problema de la Tuberculosis en Puerto Rico—J. Rodriguez Pastor.
- Ensaio de Sistematizacao na Terapeutica Das Cavernas Pulmonares—Jose Silveria.
- La Cirugia Radical del Pulmon: Pneumonectomias y Lobectomias—Antonio Rodriguez Diaz; Hilario Anido Fraguio; Angel Guiral Casielles; Jose L. Novas Aguilar; and Rafael Nobo Pividal.
- Contribucion a la Sistematizacion del Tratamiento de Las Cavidades Residuales—Dr. Antonio Navarrete Sierra.
- Treatment of Empyema—Lt. Biagio Battaglia, (MC), USNR.
- Closure of Tuberculous Cavities—John Loesch, M.D.
- Bilateral Artificial Pneumothorax—John B. Andosca, M.D., and John A. Foley, M.D.
- The Problem of Tuberculosis Control—John A. Foley, M.D., and John B. Andosca, M.D.
- A Suggestion for Improving the Structure of the Cardiac Coronary Circulatory System without Surgical Intervention—Jose A. Amadeo, M.D.

Books:

- Estudo Anatomo-Clinico das Atrofias Cerebelares—Jerbas Penambucano.
- Yellow Magic by J. D. Rateliff—from Charles E. Dutchess, M.D.

Report:

- Annual Report for the year 1944—Erie County Tuberculosis Hospital, Erie, Pennsylvania—from Dr. R. S. Anderson, Supt., Med. Dir.

READER NOTICE

Chest specialists alert to the development of a satisfactory tool for the medical profession, have created a sustained demand for the rotating anode tube recently perfected by Machlett Laboratories, Inc., it was reported in the Cathode Press, the Machlett house organ, published at Springdale, Conn.

The new tube eliminates the three serious deficiencies which had been blocking widespread use of the rotating tube. These deficiencies were: shortness of life, largeness and heaviness, and the incapacity to handle the volume of work encountered in busy institutions.

Orders for Dynamax tubes received and reported recently by Machlett include a large one from the Picker X-ray Corporation, the Machlett dealer supplying the tubes for the U. S. Public Health Service for use in mass surveys.

The Canadian government will use Dynamax tubes purchased from Machlett by Feranti Electric, Ltd., one of their Canadian dealers, while the U. S. Army, through Kelley-Koett Company, has placed an order for the same tube to replace the stationary anode tubes now installed in the Army's major hospitals. A British distributor, Watson & Sons (Electro-Medical), Ltd., has also been purchasing a large number of these Machlett tubes.

The Cathode Press reports that there is a wide demand for the improved type of radio-graphic tube. Machlett officials maintain that the increased demand for this type of tube has underlined its suitability for producing precision work at an extremely rapid rate.

They explained that the time element was a very important factor because short exposures could be used, which resulted in exceptionally clear definition. Heat dissipation was accelerated and shorter cooling periods were needed. They asserted that the Dynamax is the most highly specialized tube for diagnostic work in the X-ray field, and it is rapidly replacing the stationary anode tube where used for such applications.

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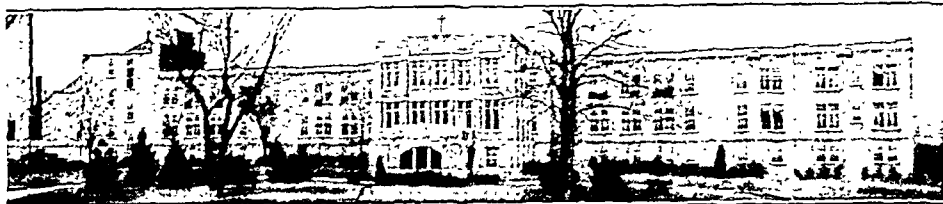
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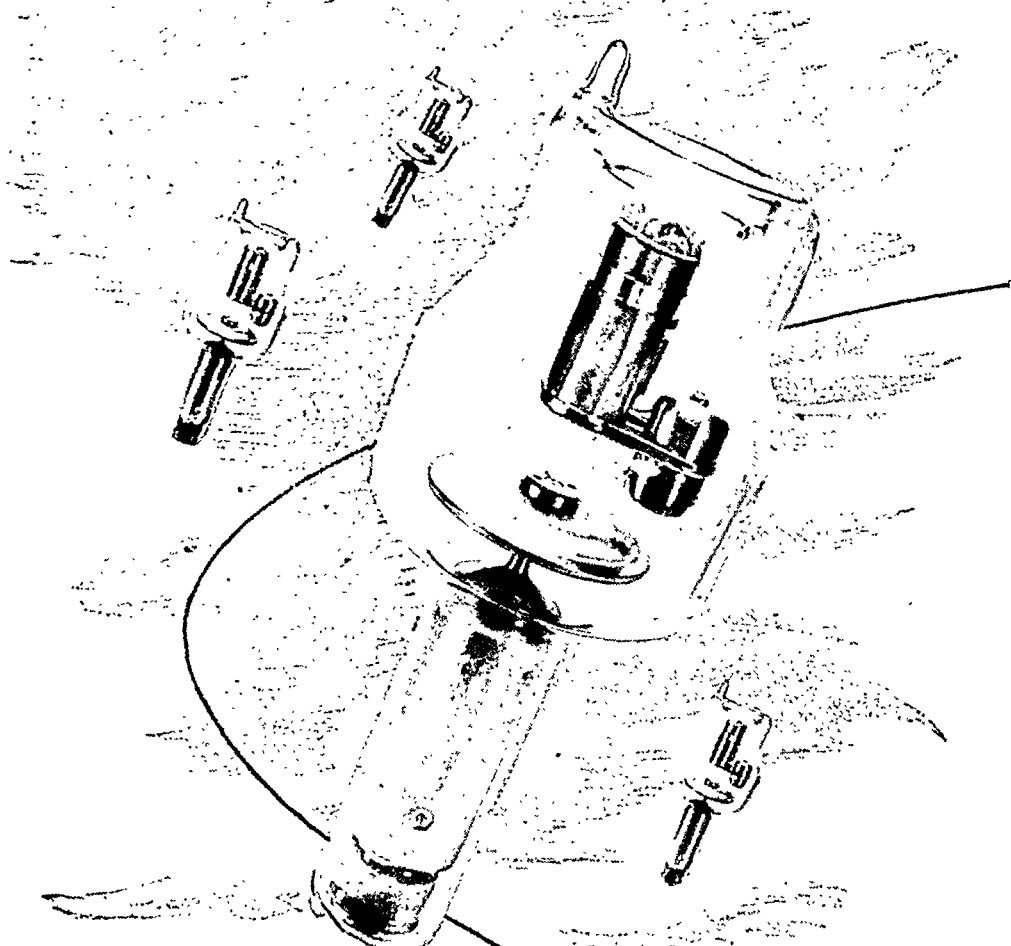
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CONTENTS:

ANALYSIS OF ONE HUNDRED CASES OF MINIMAL PULMONARY TUBERCULOSIS	375
H. Orrego Puelma, M.D., F.C.C.P., and Guillermo Grebe, M.D., Santiago, Chile	
LOEFFLER'S SYNDROME (TRANSIENT PULMONARY INFILTRATIONS WITH EOSINOPHILIA)—Report of a Case and a Review of the Available Literature	380
H. I. Spector, M.D., F.A.C.P., F.C.C.P., St. Louis, Missouri	
BRONCHOSCOPY IN PULMONARY TUBERCULOSIS	392
'Ricardo Tapia Acuña, M.D., Mexico City, D. F.	
INTRODUCTION—Refresher Course on Diseases of the Chest	398
Minas Joannides, M.D., F.C.C.P., Chicago, Illinois	
THE PRESENT STATUS OF TUBERCULOSIS IN CHILDREN	399
Arthur S. Webb, M.D., F.C.C.P., Glen Ellyn, Illinois	
MANAGEMENT OF MINIMAL TUBERCULOSIS	405
Julius B. Novak, M.D., F.C.C.P., Chicago, Illinois	
PREGNANCY IN TUBERCULOSIS	409
Fred M. F. Meixner, M.D., F.C.C.P., Peoria, Illinois	
CHEMOTHERAPY OF TUBERCULOSIS	419
Charles K. Petter, M.D., F.A.C.S., F.C.C.P., Waukegan, Illinois	
INDICATIONS FOR COLLAPSE THERAPY	423
Richard Davison, M.D., F.C.C.P., Chicago, Illinois	
RECENT ADVANCES IN BRONCHOSCOPIC TECHNIC	427
Paul H. Holinger, M.D., F.C.C.P., Chicago, Illinois	
THE TREATMENT OF BRONCHIECTASIS	431
Edwin R. Levine, M.D., F.C.C.P., Chicago, Illinois	
SURGICAL PROCEDURES IN NON-TUBERCULOUS DISEASES	440
Ralph B. Bettman, M.D., F.A.C.S., Chicago, Illinois	
ELEVENTH ANNUAL MEETING, BOARD OF REGENTS	447
COLLEGE CHAPTER NEWS	487
COLLEGE NEWS	487
NOTICES	489
OBITUARY: (Dr. William Frederick Bennett)	491
ABSTRACTS	492
BOOK REVIEWS	494

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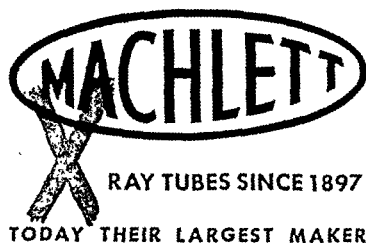


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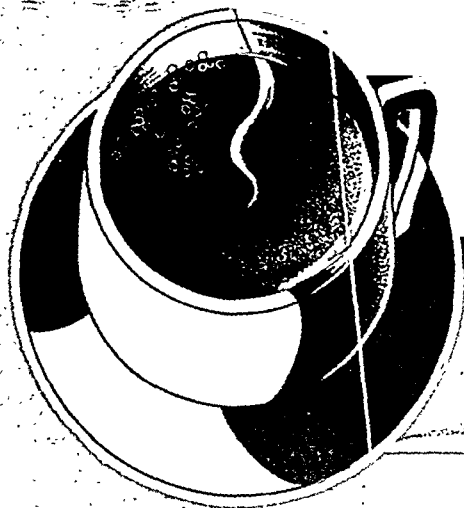
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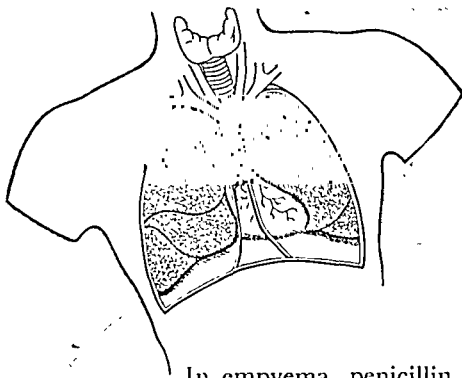
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Butler, E. C. B.; Perry, K. M. A., and Valentine, F. C. O. Brit. M. J. 2:171 (Aug. 5) 1944.

Three cases of postlobectomy empyema showing mixed infection, with *Cl. welchii* in the drainage, responded favorably to penicillin and open drainage. Penicillin was given parenterally for 15 to 18 days, in total dosages up to 3,600,000 units.

Poppe, J. K. J. Thoracic Surg. 13:340 (Aug.) 1944.

Frequent aspiration of the cavity, and injection of 10,000 to 25,000 units of penicillin, resulted in sterilization of empyema cavities in 19 patients. In another study comprising 34 cases of pneumococcal empyema, aspiration of pus and daily injection of penicillin maintained a high penicillin concentration in the pleural cavity and obviated surgical drainage.

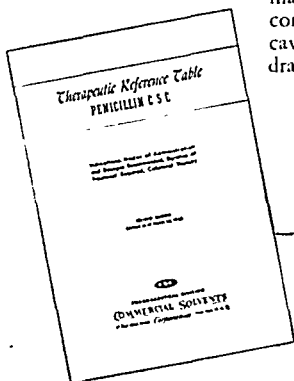
Lockwood, J. S.; White, W. L., and Murphy, F. D., Ann. Surg. 120:311 (Sept.) 1944.

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Herrell, W. E., and Kennedy, R. L. J., J. Pediatr. 25:505 (Dec.) 1944.

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Roberts, J. E. H.; Tubbs, O. S., and Bates, M., Lancet 1:39 (Jan. 13) 1945.



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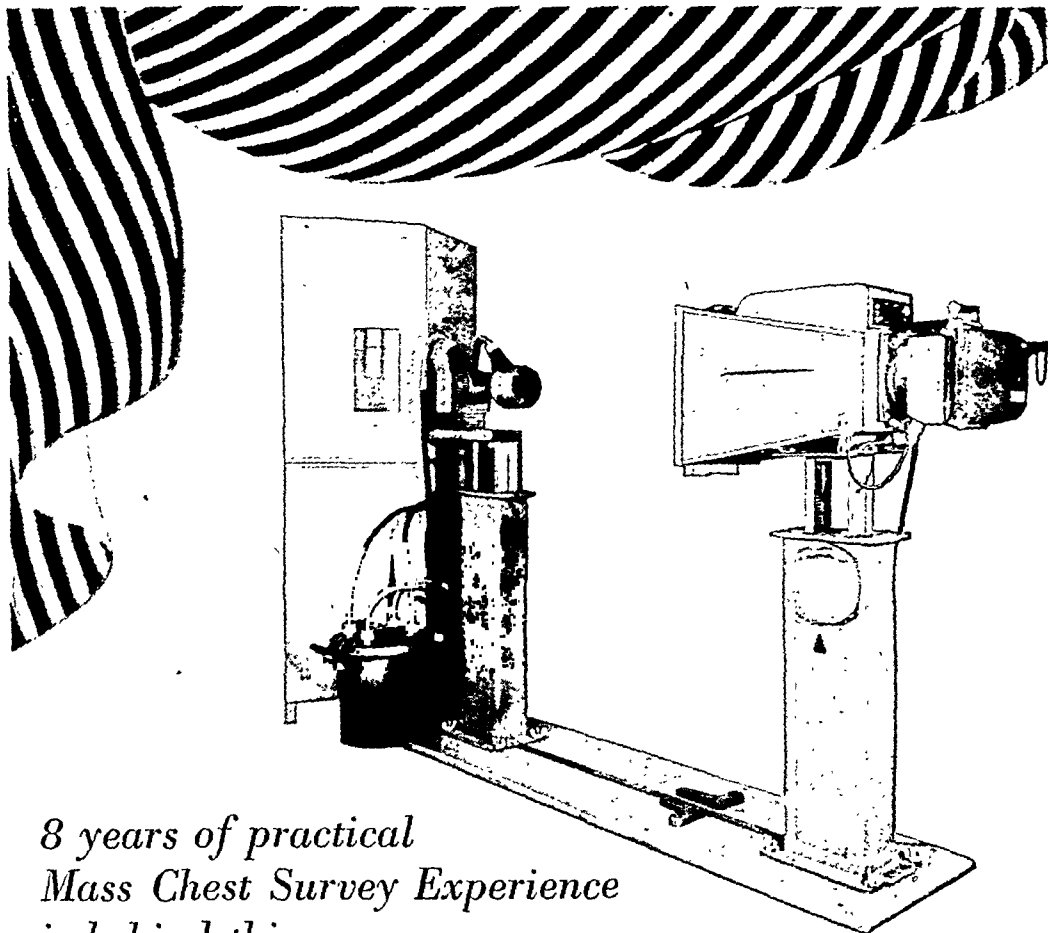
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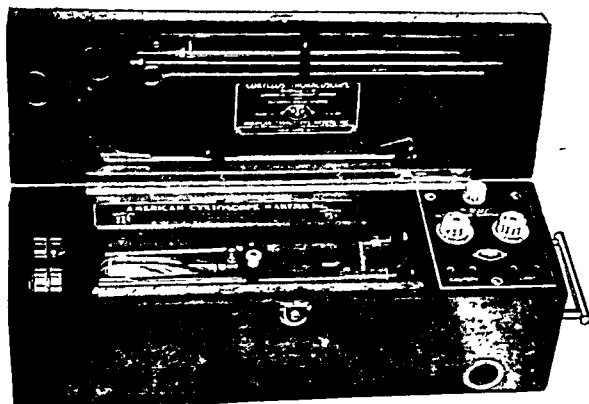
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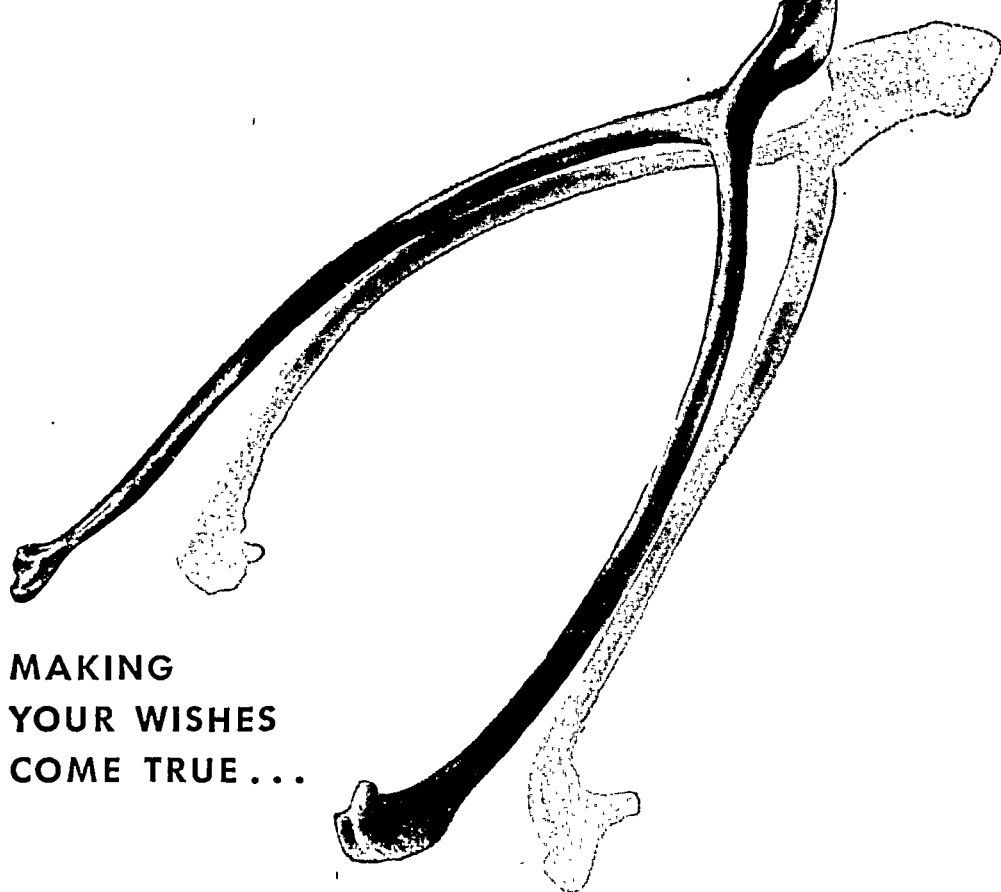
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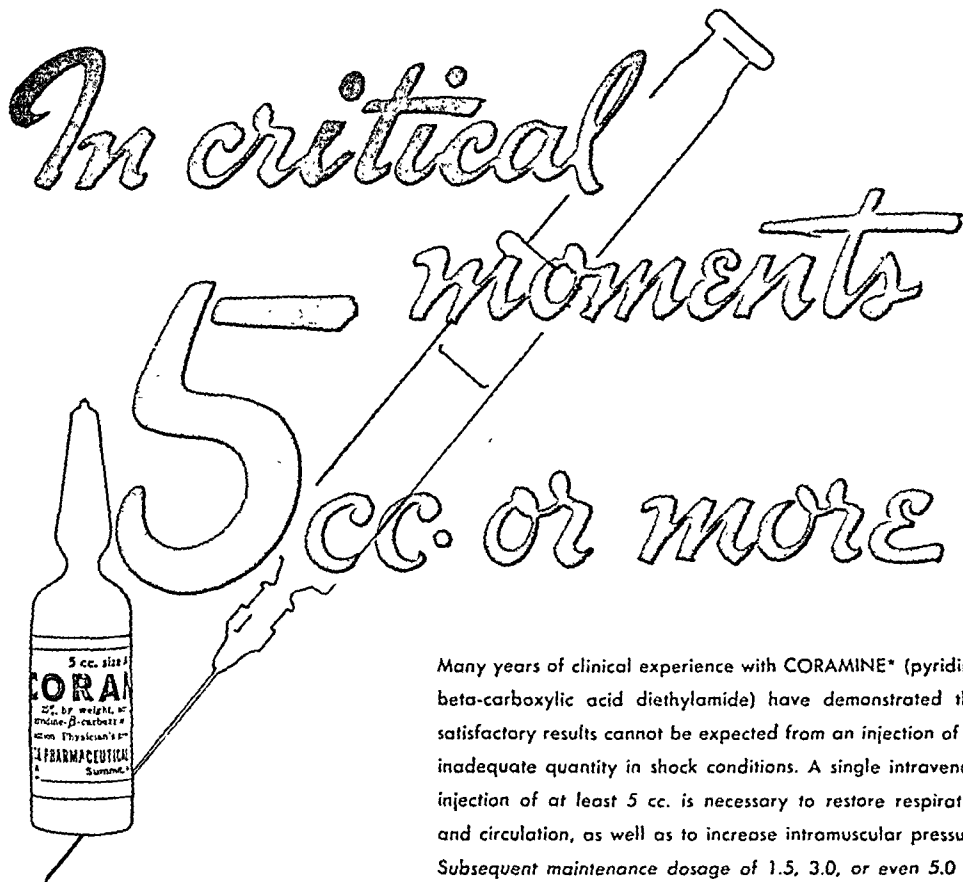
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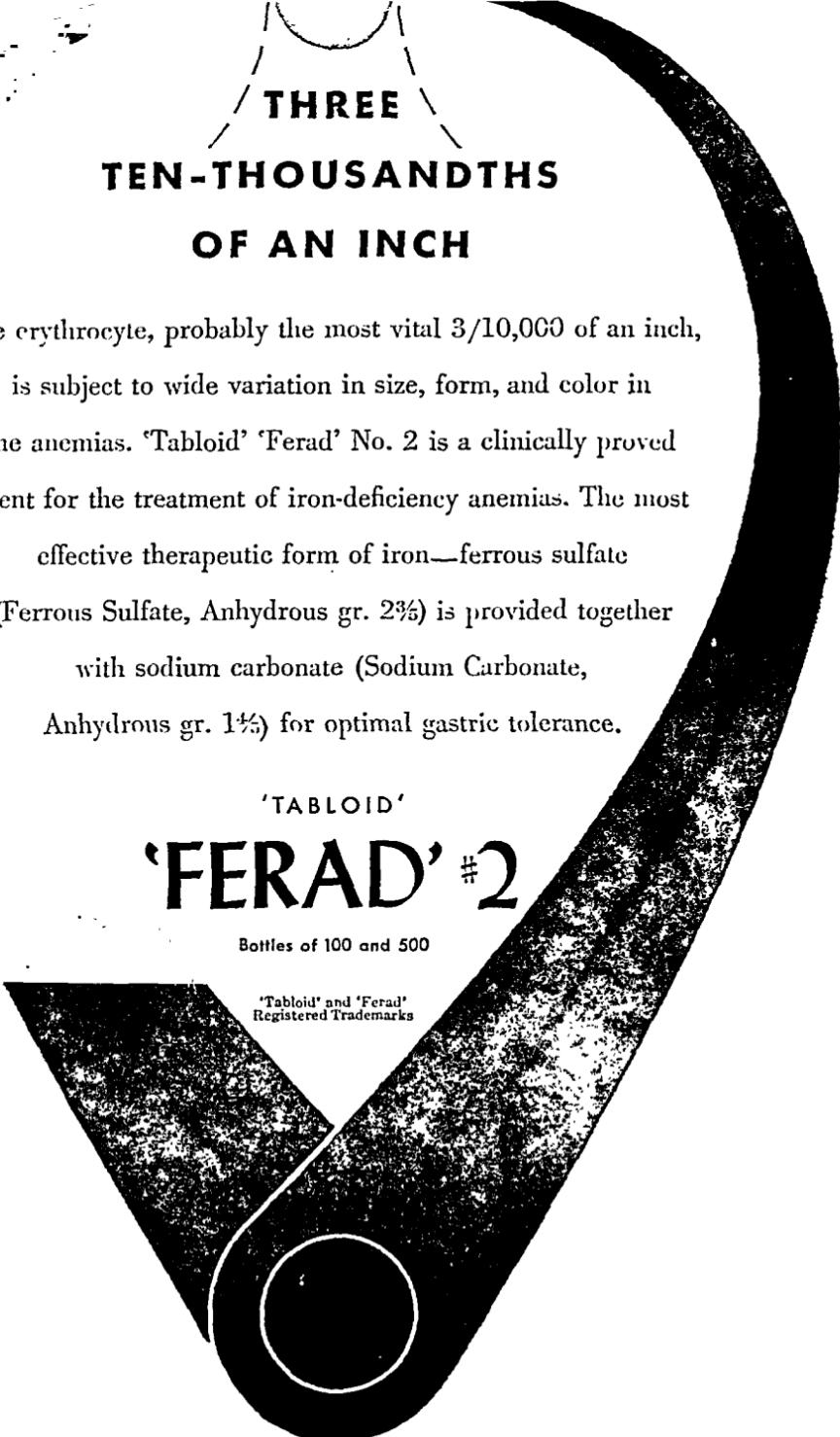
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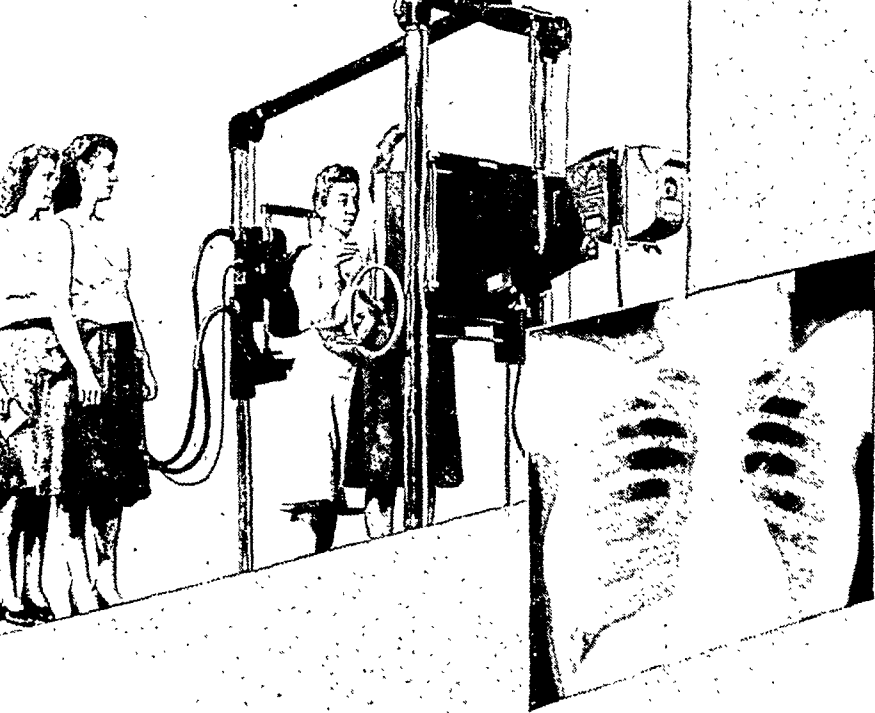
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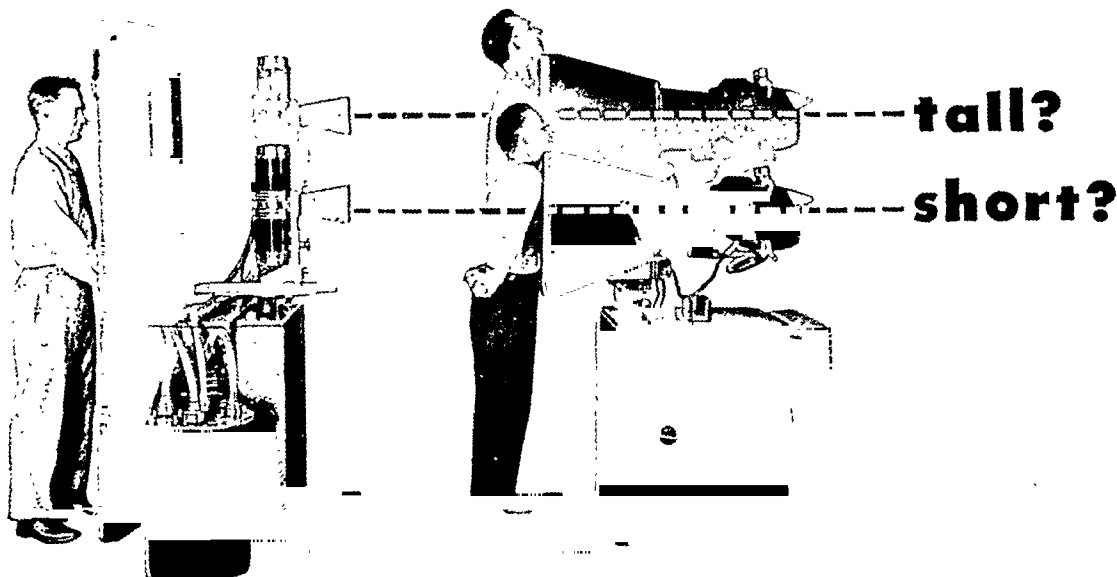
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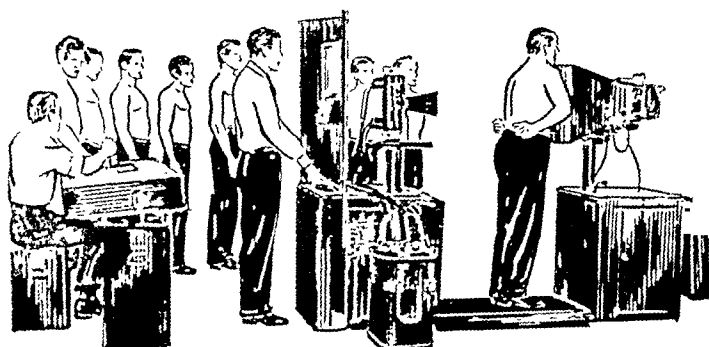
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DISEASES *of the* CHEST

VOLUME XI

SEPTEMBER-OCTOBER, 1945

NUMBER 5

Analysis of One Hundred Cases of Minimal Pulmonary Tuberculosis*

H. ORREGO PUELMA, M.D., F.C.C.P.,** and

GUILLERMO GREBE, M.D.***

Santiago, Chile

In this paper the beginning and evolution of 100 cases of pulmonary tuberculosis of minimal extent, selected solely on the basis of their conforming to the definition, have been carefully analyzed. The definition reads: "Minimum or superficial lesions without apparent cavity, limited to a small area in one or both lungs. The total involvement, ignoring its distribution, should not exceed the equivalent in volume of the lung tissue which lies above the second chondrosternal junction and the spine of the fourth or body of the fifth thoracic vertebra on one side." Furthermore, we studied only those cases which had two years' evolution, at least.

We have considered the age and sex of the patients, the type of lesion, the presence or absence of Koch bacilli in the sputum at the start, the sedimentation test, contact with infective persons, the symptomatology, both objective and subjective, and the treatment. The cases in which we had the blood count at the beginning and during the evolution were so few that we could not take this data into consideration. We have also included some important comments.

Of our cases there were:

6 private patients.

31 from Caja de Seguro Obrero Obligatorio (insured workers).

63 from Servicio Medico Nacional de Empleados (insured employees).

42 women.

58 men.

Ages were grouped as follows:

47 of 15 - 25 years.

40 of 25 - 35 years.

13 over 35 years.

*Read before the Tenth Annual Meeting, American College of Chest Physicians, Chicago, Illinois, June 12, 1944.

**Professor of Tuberculosis and Lung Diseases, School of Medicine, University of Chile.

***Assistant and Member of National Medical Service for Private Employees, Santiago, Chile.

Figures relative to age confirm the information obtained through other analyses on tuberculosis carried out in Chile, which find the highest morbidity in individuals between 20 and 30 years of age.

With regard to Koch bacilli, we have endeavored to take as a basis a complete investigation of sputum and/or gastric washings. Only in very few cases has such an initial investigation been omitted, the reasons for this being residence of patients in towns lacking properly equipped laboratories, or appearance of the lesion while public health services were not fully established. Of the one hundred cases analyzed, 14 had only direct initial investigation of Koch bacilli, and the remainder had the complete series of direct examination, culture and inoculation. Of the one hundred cases of radiologically evident lesions, we found 33 (33%) with bacilli in the sputum or gastric contents at the beginning of our clinical study. Of these, 30 evolved into a negative state and remained thus for two years, some even through five years. Disappearance of bacilli from sputum or gastric contents was secured after six months to one year; only one case remained positive for three years.

Subjective symptoms amongst the 33 initial bacilli-positive cases were present in 28 cases (84.8%), and consisted of decrease in weight, cough and expectoration, general toxic and dyspeptic manifestations, hemoptysis and dorsalgia.

In the initial bacilli-negative group (67 cases), eighteen (28.8%) evolved into a positive state. Several of these cases, when persistently controlled, had only one or a few positive results to culture or inoculation.

Amongst the 49 minimal cases which were never bacilli-positive, we find 33 cases of manifest activity during the five year control. Of these 33 cases, 23 showed tendency toward improvement or apparent cure, and 10 toward becoming worse. It is interesting to note that in the latter group search for Koch bacilli was made on numerous occasions, using the procedures of culture and inoculation. Sixteen cases remained unchanged.

Of the cases initially bacilli-negative and evolving into a positive state, one showed no change in the lesion, three had favorable evolution and fourteen unfavorable. Of the last, one underwent a severe evolution which resulted in fatal hemoptysis. Changes in bacilli coincided almost invariably with lesional increase.

Considering the evolution of the lesions in our group of 100 cases, we saw that out of 33 initially bacilli-positive cases, 10 (30.3%) underwent a lesional increase; and out of 67 initially bacilli-negative cases, 24 (35.8%) also underwent an unfavorable evolution. In view of these figures we can state that the finding of Koch

bacilli in cases of minimal pulmonary lesions has no prognostic significance.

It is pertinent to note that the figures referring to blood sedimentation can be divided into two groups, not notably different, 47 cases having normal sedimentation and 53 with varying increases (Westergren method). Let us analyze the lesional evolution in both groups:

Normal sedimentation rate: 9 cases stationary.
 13 cases of lesional increase.
 23 cases of lesional decrease.
 2 cases unstable.

i.e., 34 per cent of unfavorable cases, including the unstable ones.

Increased sedimentation rate: 9 cases stationary.
 15 cases of lesional increase.
 29 cases of lesional decrease.

i.e., 28.3 per cent of unfavorable cases. Since there is no pleurisy amongst our cases, the increased sedimentation rate is not influenced by this factor. The above figures indicate that in cases having a normal sedimentation rate at the beginning, unfavorable evolutions are more frequent than in those showing an initial increased rate.

In a study made by Dr. Yelic (Santiago, Chile) amongst patients of the Caja de Previsión de Empleados Particulares, similar results were obtained. In our opinion, the sedimentation rate does not have a high prognostic value in minimal pulmonary tuberculosis.

With regard to treatment, we should mention that active collapse methods were put into practice only in cases showing obvious unfavorable evolution, particularly those showing cavity formation. Generally, when cases showed on the roentgenogram an exudative aspect, the patients were placed in sanatoriums or put on a strict rest regimen.

Recoveries obtained by means of these three methods of treatment, which were occasionally and temporarily combined, were as follows:

40 by rest cure in the home.
19 by rest cure in the sanatorium.
14 by pneumothorax.

We considered as recoveries those cases apparently cured or in which the lesions remained unchanged from the beginning and for a minimum of two years, for which reason the lesions are considered inactive.

Cases of unfavorable evolution were divided as follows:

11 cases on home rest cure (plus one unstable case).
8 cases of sanatorium rest cure (plus one unstable case).
6 cases of pneumothorax.

In this group there were two deaths: one who was undergoing sanatorium rest cure and one under pneumothorax treatment. Undoubtedly, it is difficult to compare the results shown, due to the fact that treatments must be combined or changed as cases warrant: one case having unfavorable evolution in the home is taken to the sanatorium, or treated with pneumothorax, if necessary, thus preventing an exact appraisal of the results of each individual method of treatment.

Regarding objective symptomatology, only 11 cases showed some positive signs: i.e., the physical examination provided information in 11 per cent. In some of these cases the findings consisted exclusively of changes in resonance to percussion or in the vesicular murmur. In 7 cases we found fine rales in the affected region. This is another argument in favor of radiological investigation as the only dependable source of information in mass case-finding, when looking for early cases and patients curable in a moderate length of time.

We have also included in our study the factor of contagion amongst our patients. This information, secured through case history, had, for this particular group, a great importance, since it refers to individuals of a satisfactory cultural level and therefore reliable (civil servants, private employees and journalists). We found 37 cases of evident contact with bacilli-positive patients, and amongst them, 18 who experienced heavy infections through intimate living with parents, brothers or spouses.

We regret, indeed, being unable to refer to our patients' contacts, due to the fact that investigations are too few to justify any conclusions.

COMMENTS AND SUMMARY

a) Thirty-four per cent of progressive cases amongst one hundred cases of pulmonary tuberculosis of minimal extent leads to the belief in the necessity of an absolute preventive rest cure for such patients until definite inactivity of the lesion has been established. Otherwise, severe evolutions of such cases will postpone considerably a complete cure, and may even prevent eventual recovery.

b) An initial bacilli-negative state, established through search for bacilli in sputum and gastric contents by means of direct examination, culture and inoculation, is not enough to determine lesional inactivity in view of the fact that in our study 35.8 per cent of individuals having x-ray findings worthy of being considered minimal tuberculous lesions, and who were bacilli-negative, underwent unfavorable evolutions in relatively short periods.

c) It is possible to secure the recovery of a high percentage of

tuberculosis patients having minimal lesions by means of absolute rest in the home, without resorting to pneumothorax or sanatorium care, provided there is control to see that the rest cure is carried out as prescribed.

d) The blood sedimentation test appears to be influenced to a much less degree in cases of minimal tuberculous lesions than in primary lesions or secondary and advanced reinfection lesions.

e) Clinical examination provides information for diagnosis of tuberculosis of minimal extent in very few cases. Consequently, it cannot be relied upon for epidemiological investigations of tuberculosis, which should depend on the x-ray instead as a fundamental source of information.

COMENTARIO Y RESUMEN

a) El treinta y cuatro por ciento de casos progresivos, entre cien casos de tuberculosis pulmonar de extensión mínima, conduce a la opinión de la necesidad del reposo preventivo absoluto en estos pacientes hasta que se haya establecido la inactividad bien definida de la lesión. De otra manera, graves evoluciones en estos casos aplazarán considerablemente la curación completa, y pueden hasta impedir el restablecimiento final.

b) Un estado inicial bacilo-negativo, establecido mediante la busca de bacilos en el esputo y el contenido gástrico por medio de examen directo, cultivo e inoculación, no es suficiente para determinar la inactividad de la lesión, en vista del hecho de que en nuestro estudio el 35.8 por ciento de individuos en que se manifestaban hallazgos radiológicos merecedores de ser considerados lesiones tuberculosas mínimas, y que eran bacilo-negativos, sufrieron evoluciones adversas en períodos relativamente cortos.

c) Es posible obtener la recuperación de un alto porcentaje de pacientes tuberculosos con lesiones mínimas mediante el reposo absoluto en la casa, sin recurrir al neumotórax o al tratamiento en sanatorios, con tal de que exista control para que se lleve a cabo la cura de descanso en la forma recomendada.

d) La prueba de la sedimentación de la sangre parece ser afectada en un grado mucho menor en lesiones tuberculosas mínimas que en lesiones primarias o en lesiones de reinfección avanzadas.

e) El examen clínico sólo proporciona información para el diagnóstico de tuberculosis de extensión mínima en muy pocos casos. Por consiguiente, no es de confiar en las investigaciones epidemiológicas de la tuberculosis, las que deben estar basadas sobre la radiografía como fuente fundamental de información.

Loeffler's Syndrome (Transient Pulmonary Infiltrations with Eosinophilia) **

Report of a Case and a Review of the Available Literature

H. I. SPECTOR, M.D., F.A.C.P., F.C.C.P.*
St. Louis, Missouri

HISTORICAL

In 1932, William Loeffler,¹ Professor of Medicine at the University of Zurich, described the syndrome that bears his name. Briefly described, the syndrome is characterized by a mild group of symptoms, a scarcity of physical signs, a blood eosinophilia varying from less than 10 per cent to more than 60 per cent, a benign course and spontaneous healing usually within a period of two to three weeks.

Since his description, there have been relatively frequent reports of cases almost all of which have shown so striking a similarity in symptomatology, physical, x-ray and blood findings, that a definite entity has been recognized to which the name *Loeffler's Syndrome* has been given. By 1936, Loeffler alone reported 51 cases, all from Switzerland. To date, case reports have appeared in the medical literature of the Scandinavian countries, France, Holland, Palestine, Canada, Spain, Germany, Italy, Britain, China, Japan, Hawaii, and from many of the South American countries. In this country, cases were reported by Soderling,² Smith and Alexander³ in 1939, Stuart,⁴ Freund and Samuelson⁵ in 1940, Baer⁶ in 1941, Hoff and Hicks⁷ and Karan and Singer⁸ in 1942, Smith⁹ in 1943, Pirkle and Davin,¹⁰ Slowey,¹¹ Peabody,¹² Ryan,²⁶ Jones and Sauders,²⁷ Hansen, Pruss and Goodman²⁸ in 1944, Miller,²⁹ and Hennel and Sussman³⁰ in 1945.

ETIOLOGY

An adequate explanation of the etiology is still lacking, probably because there is no uniform cause. Loeffler first thought that the condition might be a benign form of tuberculosis. However of the 37 cases tested with tuberculin, 13 were negative. He later considered the role played by parasites causing the condition and still later thought that the eosinophilia was an expression of an anaphylactic process.

A review of the literature to date leads one to the conclusion

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that tuberculosis can easily be dismissed as a causative factor. The parasitic theory, however, must be considered in view of the numerous case reports, mainly in children, where a blood eosinophilia and transient pulmonary infiltrations were accompanied by intestinal parasites, such as amoebiasis,⁷ trichiniasis,¹¹ and ascarides.¹³ Wild,¹⁴ who reported two cases of *ascaris lumbricoides*, thought that the larvae penetrated the intestinal wall and were carried by the portal vein or the thoracic duct to the right heart, thence to the right lung where they caused a local reaction with atelectasis and penetrated the alveoli and then were coughed or carried up and expectorated or swallowed. Case reports in the literature of Loeffler's syndrome associated with distomatose hepatic¹⁵ and *necator americanis*¹⁶ further strengthen the parasitic theory.

In addition to the parasitic theory, the allergic theory must, in the face of the accumulating evidence, receive serious consideration, since some of the cases of Loeffler's syndrome reported have been in individuals, often children, whose allergic symptoms such as vaso-motor rhinitis and especially asthma, led to the discovery of the condition.

Stefano¹⁷ reported a case of recurring asthmatic attacks in which transient areas of pulmonary infiltrations were demonstrated by x-ray and in which amoebae were found in the sputum but not in the stools. Both amoebae and asthma disappeared after treatment with emetine.

Engel¹⁸ of Shanghai should be credited with being the first to point out a definite allergic correlation. During the months of May and June, Engel noticed that for years a large proportion of the inhabitants of China were stricken by a peculiar bronchitis which in every day life is called "privet cough". Privet is the name of a species of *ligustrum* which flowers at the time mentioned. The complaint manifests itself in a cough of moderate intensity, with scanty yellow sputum having a metallic taste, and lasts only 2 days. Engel became interested in it because he suffered from it five years previous to his report. He therefore had x-rays made in the spring of two different years and on both occasions they revealed a massive pulmonary consolidation which completely cleared up after one day on one occasion and in 6 days on the second occasion. Blood showed eosinophilia from 20 to 25 per cent with an otherwise normal blood picture. At random, he chose one of his friends who complained of a similar cough and he showed the same things on x-ray, and cleared in 7 days. Engel reported two cases in 1935 and proposed the name of allergic pulmonary edema for the disease. On the basis of observations on more than 100 cases and reports in the literature, Maier¹⁹ is also convinced

that temporary pulmonary infiltrations with blood eosinophilia are of an allergic nature.

Engel also was the first to point out, after studying Loeffler's cases, the very seasonal incidence. Most of the cases have been reported during the months of July and August. A smaller group of cases have been reported during the spring months. Almost two-thirds of the reported cases were in males, mostly adults. The condition has been reported in members of the same family.

The marked seasonal incidence and the epidemic form suggest an infectious agent as the cause of the condition and it is for this reason that one has to consider an atypical virus infection as the cause of the pulmonary infiltration which in re-absorbing would elicit eosinophilia since such a virus infection as dengue may cause rather marked eosinophilia.

Over-exposure to the sun has been mentioned in the literature as a cause of the condition by Gaines²⁰ and Wieland.²¹

Wieland suggested that climatic influences should be borne in mind; he stated that indiscreet and prolonged exposure to the sun may lead to transient congestive conditions in particular areas of the lung.

In summing up the conclusions in the more recent literature on the subject, one is led to the dominating view that allergic phenomena play a decisive role in the pathogenesis of Loeffler's disease.

PATHOLOGY

Since the clinical course in Loeffler's disease is mild, and since spontaneous healing takes place, autopsy material is rarely available. Obviously an accurate description of the pathologic process is not possible. While Smith and Alexander³ reported a case in a child seven years of age with autopsy findings, an analysis of the symptoms and physical findings leaves a doubt as to whether or not the child actually died from this disease.

According to Loeffler's early reports, the pathogenesis is similar to erythema nodosum, the lung reacting with an inflammatory exudate to a toxin.

Some authors regard the lung changes as due to lung emboli, infarcts, localized bronchial asthma or atelectasis.

Engel believes that a localizing allergic edema of the lungs is responsible for the entire picture.

Von Meyenburg²² maintains that the transient infiltrations represent an eosinophilic pneumonia. Based on four accidental deaths he found that the infiltrations were of pneumonic type with exudation into the alveoli and with eosinophilic infiltration of both the alveoli and the interstitial tissue. There was an inflammatory involvement of the pleura and of the interlobar fissures.

SYMPTOMS

Loeffler's syndrome in a typical case consists of a low grade fever, some cough with expectoration, some fatigue. Occasionally a metallic taste to the sputum exists; not infrequently the condition is accompanied by a mild pain in the chest. Not uncommonly asthmatic breathing is noted. On the whole, the course in a typical case is so benign that the condition is discovered in the course of a routine examination. Twenty-five per cent of all Loeffler's cases were discovered accidentally. It is the discrepancy between the benignity of the entire course and the striking objective findings in the blood and in the roentgenogram which is responsible for the mistakes in diagnosis. A form described by Lohr and Kindberg²³ differs from Loeffler's type in that the acute symptoms are severe almost like those of a septic process and that the process is extremely protracted and persists for months. Kartagener²⁴ describes a case which he regards as representative of a third type of eosinophilic infiltration. This form is characterized by chronicity and mildness of the symptoms. Whether the three types of eosinophilic infiltrations represent three varieties of the same disease or whether they are distinct entities is difficult to decide.

COMPLICATIONS

In one case mentioned by Karan and Singer,⁸ there was increased resistance in the pulmonary circulation resulting in right ventricular strain. With the absorption of the pulmonary exudate, the heart returned to normal size. A few cases have been reported with complicating pleural effusions. Asthma associated with or preceding the initial onset of Loeffler's syndrome has been reported. In the writer's case, asthma followed the initial attack of Loeffler's syndrome.

PHYSICAL SIGNS

The physical signs are few in number. Dullness on percussion and diminution of breath sounds over the involved area can be elicited. A few migratory rales have been noted. Generally speaking, there is a paucity of physical signs when compared with the extensiveness of the fluoroscopic and x-ray shadows.

LABORATORY FINDINGS

The outstanding laboratory finding is the blood eosinophilia which ranges from 10 to over 60 per cent. One case has been reported with an eosinophilia of 85 per cent.²⁹ In some instances the eosinophilia reaches a peak when the pulmonary infiltrations had almost completely disappeared. Eosinophilia persisted in some of the cases for some time. There was no strict parallelism between

the extent of the eosinophilia and the pulmonary infiltrations. White cell counts varied from 8,000 to 15,000. Occasionally there was a leucocytosis up to 20,000. Sedimentation rate ranged from 8 to 15 mm. in one hour. In some a more rapid rate was observed. Sputum was negative for tuberculosis in all instances.

The shadows seen on x-ray have been variously described as follows:

1. Large, more or less irregularly outlined, densities which were unilateral or bilateral.
2. Small infraclavicular infiltrations of the type described by Assmann.
3. Multiple unilateral or bilateral circular densities.
4. Sharply defined densities situated in the right middle lobe.
5. Infiltrations indistinguishable from the adult type of pulmonary tuberculosis.
6. Homogenous or nodular densities.

The characteristic x-ray pictures described by Loeffler consists of consolidations which appear suddenly in various parts of the lung and disappear rapidly while others appear in another portion of the lung. The shadows are more frequently found in the lower lung fields near the diaphragm and vary in size. They disappear in approximately a week or two and usually leave only very fine fibrous star-shaped scars. In the writer's case (Figs. 1, 2, 4) the infiltrations seem peripherally placed on both sides.

DIAGNOSIS AND DIFFERENTIAL DIAGNOSIS

The diagnosis of Loeffler's syndrome can only be made, first, by the blood eosinophilia; second, by the transient x-ray shadows and third, by the clinical course. An allergic history prior to onset of symptoms is an aid in diagnosis—positive stool findings, whether amoebae or other parasites, calls for blood studies and x-ray of chest. Frequently a definite diagnosis can only be made through the medium of serial x-ray films of the lungs and after the condition has subsided.

In the differential diagnosis the following conditions must be considered: pulmonary tuberculosis, pulmonary embolism with infarction, pneumonia, bronchial asthma with partial atelectasis, erythema nodosum and anything that causes fleeting pulmonary infiltrations, such as seen in virus respiratory infections.

PROGNOSIS

The prognosis is good. There is usually spontaneous disappearance of physical signs, x-ray shadows and blood eosinophilia in a period of a week to three weeks. A few cases have been reported where the condition lasted a longer period with delayed recovery.^{5,21,22}

TREATMENT

There is no specific treatment for the condition; it heals spontaneously. Emetine Hydrochloride—1cc. intramuscularly for two days—where entamoeba was found was used by Hoff and Hicks.⁷ All symptoms disappeared after treatment with this drug, and stool was negative.

In December, 1937, Meyer²⁵ reported eight cases, including one case which had sudden rhinitis, conjunctivitis and swelling of the face accompanied by eosinophilia and transitory lung infiltrations. He used calcium therapy and removal of contact from pollen to which patient gave a strong positive reaction, after which all symptoms and signs disappeared. Obviously in treating this condition successfully a search should be made for any allergen whether it be an intestinal parasite or pollen as a direct or indirect cause of the condition, and same removed with specific treatment for the parasites and removal from pollen. Bed-rest and symptomatic treatment will heal all other types of transient pulmonary infiltrations with eosinophilia. Weingarten³¹ in India, recently des-



FIGURE 1

Flat Roentgenogram (Fig. 1):

Brought by patient, taken on 7/7/42, revealed an inflammatory process peripherally located, involving the first and second interspaces on the right side, and the lateral third from apex to base of left lung. Roentgenogram taken on 7/26/42 (Fig. 2), reveals clearing of the lesion in the first and second interspace on the right side but extension to the base on the same side not seen in the film of 7/7/42. Likewise, on the left side of the infiltrations previously noted in the first interspace have disappeared. There has also been some clearing of the lower half of the same side. These films show the transient character of the inflammatory process characteristic of Loeffler's syndrome.

Laboratory Tests:

Sputum was negative for tubercle bacilli on direct smear and after concentration. Blood study revealed the white count to be 11,200; red count, 5,200,000; hemoglobin, 80%. Modified Arneth Schilling count was as follows:

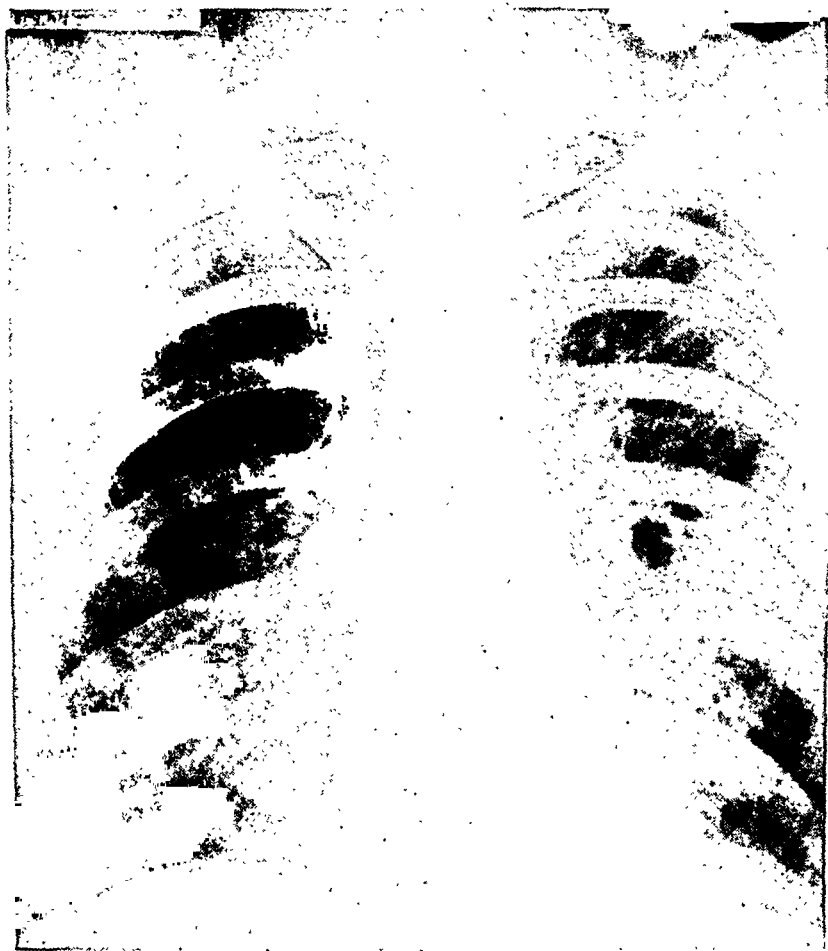


FIGURE 4

<i>Basophile</i>	<i>Eosinophile</i>	<i>Stab</i>	<i>Segmented</i>	<i>Lymphocytes</i>	<i>Monocytes</i>
0	51	4	30	81	7

Urine was negative.

Because of the history of nasal allergy, the transient character of the inflammation and particularly the eosinophilia (Fig. 3), a diagnosis of Loeffler's syndrome was made and patient was given symptomatic treatment based upon the supposition that the condition was an allergic pneumonitis. Specifically, he was given the following prescription—3 per cent ephedrine sulphate 10cc., saturated solution of potassium iodide 10 cc., and syrup of white pine to make a four ounce mixture; dose, one teaspoonful four times a day.

On September 4, 1942, the patient returned for re-examination. He stated that since his first examination by the writer, he had stayed in bed for over two weeks and that his temperature had dropped three days after the first examination. This time he had no complaints with the exception of weakness. His weight was 156½ lbs., temperature, pulse, and respirations were within normal limits. White count, 7800, red count, 6,620,000 hemoglobin, 90%. Modified Arneth Schilling revealed:

<i>Basophile</i>	<i>Eosinophile</i>	<i>Stab</i>	<i>Segmented</i>	<i>Lymphocytes</i>	<i>Monocytes</i>
3	2	5	45	40	5

Fluoroscopy revealed complete clearing of the previous lesion. Flat roentgenogram taken on 9/4/42 (Fig. 4), showed complete clearing of the lesion. The patient has been under observation since his attack and has been seen frequently in the office, on June 6, 1944, last, mainly because of his difficulty in breathing which seems to have developed since his attack of Loeffler's syndrome. His symptoms and physical signs, and present history, are those of a typical case of bronchial asthma. Since he states that an attack of dyspnoea and wheezing frequently follows a local treatment for his nasal condition, it is logical to assume that the patient may be allergic to the drugs used. Undoubtedly in this case the predisposing factor was an allergic background which prepared the soil for the development of the eosinophilic pneumonitis.

CONCLUSIONS

A review of the literature leads to the conclusion that Loeffler's syndrome is usually found in individuals with an allergic tendency. Intestinal parasites are frequently found in association with Loeffler's syndrome and may act as a contributory cause.

More recent investigations indicate that pathologically the condition represents an eosinophilic pneumonitis.

Bronchoscopy in Pulmonary Tuberculosis*

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The purpose of this paper is to report briefly on the work done by a bronchoscopist associated with tuberculosis specialists, for diagnosis and treatment of tuberculous lesions and other abnormalities of the bronchial tree. Two hundred seventy nine patients affected by pulmonary tuberculosis were studied and treated endoscopically. A total of 502 bronchoscopies were done. Most of these patients were seen at the Sanatorio para Tuberculosos de Huipulco, Mexico, the remainder at the Hospital General and in private practice, since 1936.

According to Brock,¹⁵ the bronchial element is one of the most important factors in pathogenesis and treatment of pulmonary tuberculosis. Our own observations prove for us the correctness of his view, and lead us to the conclusion that any clinic of tuberculosis should have facilities for carrying out the endoscopic study of the tracheobronchial tree routinely. Not every patient having pulmonary tuberculosis should be bronchoscoped, but all of them ought to be carefully studied in making a selection of cases to be sent to the bronchoscopist. That is the way we have studied most of the cases at the Sanatorio de Huipulco.

Of the 279 patients studied, 174 were male and 105 female; their ages ranged from 15 to 50 years, with adults predominating over adolescents. Tuberculous lesions were found in 83 adults of 20 to 45 years of age, or 29.7 per cent of the total group. This percentage is not excessive when it is taken into consideration that most of these patients were selected for bronchoscopy because tracheobronchial lesions were suspected.

The table on the following page indicates the types of lesion observed, and their frequency.

The solitary ulcer was seen usually as a small, round, superficial ulcer, with sharp edges, without any alteration of the surrounding tissue; bleeding at the slightest contact. Sometimes it is covered with a yellowish exudate; occasionally it looks like a simple erosion of the mucosa.

The granulomatous ulcer, which is the most common type of lesion, was seen as wide modification of the endobronchial mucosa, with yellowish granulation tissue. As soon as this tissue is removed,

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	<i>Female</i>	<i>Male</i>	<i>Total</i>
Solitary Ulcer	1	8	9
Granulomatous Ulcer	22	30	52
Hyperplastic (including tuberculoma)	8	10	18
Fibrostenotic	1	3	4
TOTAL	32	51	83

the lesion becomes reddish and bleeds easily. When it is touched with a silver nitrate solution the color turns to gray. The granulation tissue is friable; a moderate amount of purulent material can be aspirated. Stenosis of the lumen is the consequence.

The hyperplastic lesion seems to be the result of a deep infiltration of the submucosa causing remarkable stenosis of the lumen. Sometimes the trachea and one bronchus as well as the carina are involved. At other times it presents the appearance of sessile tumor. Biopsy demonstrates its tuberculous nature. The color is darker than that of the normal mucosa. Some irregularities due to ulceration may be observed.

The fibrostenotic type was recognized in this series of cases by the smoothness of the edges and its hard consistence and stiffness. A bilateral fibrostenosis was observed in one case. The patient was suffering asthmatic attacks periodically; Koch bacilli were absent from the sputum. Both lungs were affected by fibrosis, and moderate dyspnea had been present for two years. When observed endoscopically, just after the bronchoscope was withdrawn a serious attack of dyspnea appeared, and the patient fell into coma. Oxygen insufflation through the bronchoscope, which was quickly inserted again, and administration of stimulants, saved him. This patient died three months later in acute dyspnea.

The clinical diagnosis was based on the following symptoms: subjective pressure felt on the anterior wall of the chest; difficulty in expectorating; ronchi and asthmathoid wheeze, sometimes heard at a distance from the patient; subjective sensation of foreign body in trachea; snoring; intermittent vomica; cough with or without expulsion of purulent material; recurrent fever; slight or marked dyspnea; flatness on percussion of the interscapular area; rales (sub-crepitant); and signs of limited atelectasis, emphysema or condensed areas, not attributable to the effects of treatment.

The radiologic signs were variable depending on different circumstances, such as degree and type of stenosis of the bronchi

and parenchymal lesions and method of treatment applied to the lung. Localized emphysema and atelectasis due to bronchial obstruction and retention of secretions can be noticed on the x-ray films.

The distribution of tuberculous lesions of the tracheobronchial tree, was as follows:

	<i>Times</i>	<i>Percent</i>
Trachea	6	7.2
Right bronchus	25	30
Left bronchus	46	55.4
Both bronchi	4	4.8
Carina	2	2.4

This distribution includes different locations in the secondary bronchi.

The major frequency of lesions in the left bronchus would probably speak in favor of infection by the mechanism of prolonged contact with purulent secretions coming out from the lungs, considering that drainage is more difficult from this side, on account of the different angle of deviation of the left bronchus.

Different forms of local treatment were employed. Electrocoagulation did not seem to give the best results. Applications of silver nitrate solution, 10 to 30 per cent and in one case 50 per cent, were successful. The aspiration of secretions and caseous material was absolutely necessary as first stage of the treatment. Removal of exuberant tissue to get a good drainage of the lung and a better result from the application of chemical agents, was helpful. Dilatation of stenosis, insinuating the tip of the bronchoscope or using olivaire bougies, gave good results; it failed in cases of fibrostenosis.

In 83 cases of tuberculous tracheobronchitis, 28 patients were bronchoscoped one time only; 32 were bronchoscoped and locally treated from 2 to 6 times, not enough to see a definite result, but relief of symptoms was appreciable. The lesion was found healed after local treatment in the remaining 23 patients. Five of them had solitary ulcer and needed no more than two applications of 10 per cent silver nitrate solution. Seventeen had granulomatous ulceration and needed from 2 to 11 treatments in different lapses of time, between one month to more than one year. Only in one patient having hyperplastic lesion, healing and a considerable reduction of stenosis was observed after five endoscopic treatments. Practically in all these cases pulmonary treatment was already

started, and continued in some of them after the cure of tracheo-bronchitis was obtained. There was no special indication to change the method of treatment for parenchymal lesions, except in a few cases. This treatment included different methods, mainly collapse therapy.

The abnormalities observed bronchoscopically in cases of pulmonary tuberculosis, were displacement of trachea and bronchi, deformities of the lumen and partial or total stenosis of the bronchi. In those cases in which collapse of the entire lung or a definite lobe is observed, the tracheobronchial tree is displaced to the opposite side. This fact was noted many times in this series. The deformities were produced by extrinsic pressure, caused sometimes by hypertrophied glands of the mediastinum, some other times by certain type of collapse therapy. Fibrosis was another reason.

It is surprising how often total or sub-total stenosis of secondary bronchi produced by extrinsic pressure can be seen. X-Ray films help to give a correct interpretation. No modification of the mucosa can be observed, but the walls of the bronchi are intruding in the lumen. When the closure of the bronchus in communication with a cavity is incomplete, this knowledge has been helpful to the specialist, who always wants to know how effective collapse is or where the purulent material comes from, particularly when there is not a satisfactory explanation for the presence of tubercle bacilli in the sputum, in spite of clinical and radiologic control of the patient's parenchymal disease.

Aspiration through the bronchoscope before and after thoracic surgery, was done many times in this group of cases. In some of them there was a sudden drainage of the cavities, meaning a real menace to the life of the patient, a few hours after thoracoplasty. Atelectasis of the opposite lung was prevented by oportune aspiration.

There is no doubt that bronchoscopy is one of the best helps for the pthysiologist or thoracic surgeon. The procedure has many advantages and does not constitute a danger in tuberculosis. No mortality was observed that could be attributed to the introduction of endoscopic tubes or manipulation inside the tracheobronchial tree. One fatality occurred, as a result of intoxication by morphine. This patient was in bad condition, and died an hour after endoscopy was finished. Intoxication by that drug was proved. Sedatives should be used with great care in similar circumstances.

SUMMARY

a) Two hundred seventy nine patients with pulmonary tuberculosis were studied by bronchoscopy.

b) Eighty three cases of tuberculous tracheobronchitis, 29.7 per

cent, were discovered. Healing of the lesion by local treatment was obtained in 23 patients.

c) Abnormalities of the tracheobronchial tree in tuberculous patients under pulmonary treatment are briefly reviewed.

d) The importance of bronchoscopy in tuberculosis is stressed, as complementary for both diagnosis and treatment.

e) One important feature of this research is that no case of tuberculous bronchitis was discovered among people under twenty years of age, though the group included patients from 15 to 50 years old.

RESUMEN

a) Fueron estudiados mediante la broncoscopia 279 pacientes con tuberculosis pulmonar.

b) Se descubrieron 83 casos (29.7 por ciento) de traqueobronquitis tuberculosa. En 23 pacientes se obtuvo la curación de la lesión por medio del tratamiento local.

c) Se repasan suscitadamente las anomalías del árbol traqueo-bronquial en pacientes tuberculosos bajo tratamiento pulmonar.

d) Se hace notar la importancia de la broncoscopia en la tuberculosis como complemento tanto del diagnóstico como del tratamiento.

e) Un hecho importante de esta investigación fué que no se descubrió ningún caso de bronquitis tuberculosa en personas menores de veinte años, aunque el grupo incluyó pacientes de 15 a 50 años de edad.

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INTRODUCTION

Refresher Course on Diseases of the Chest*

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Chicago, Illinois

The papers presented in the following symposium represent the realization of the desire of the members of the Illinois Chapter of the American College of Chest Physicians to promote the idea of establishing refresher courses at each annual meeting. The Committee on General Arrangements for the Chicago meeting of the American College of Chest Physicians in June, 1944, decided to devote a morning program to such a course. It was felt that common subjects which are pertinent to the specialty of diseases of the chest and the kind everybody should know about, but which are usually considered trite and old, would be quite refreshing to the average Fellow who would care to take an hour or two to sit down, relax, and listen to some new angles. Furthermore, the discussion of such problems would give an opportunity to the Associate Fellows to have these common difficulties brought to their attention.

This refresher course was well attended and the comments of the Fellows who were present were enthusiastic. We of the Illinois Chapter feel that this procedure should be adopted as a part of the subsequent meetings.

In order that the general membership of the College may have a voice in this matter, the Program Committee requests your comments on the following points:

1. Should a refresher course be continued at each Annual Meeting?
2. How extensive should this course be?
3. Should it be sponsored by the local Chapter or arranged by the Program Committee?
4. Should the speakers be local men or not?

The function of the College is to be of the greatest assistance to its Fellows and Associates. Comments and suggestions on this matter will be welcomed by the Program Committee. Just send them to the Executive Office.

*Presented by the Illinois Chapter, American College of Chest Physicians, at the Tenth Annual Meeting of the College, Chicago, Illinois, June 10, 1944.

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The Present Status of Tuberculosis in Children

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This paper is intended as a broad review of the problem of tuberculous infection in children. It cannot be a complete discussion. I will confine my discussion to human pulmonary tuberculosis. The problem of bone, joint and gland tuberculosis, that was so prevalent in the past, has taken a minor place since the work of the veterinarians toward eradicating tuberculosis in cattle and the universal pasteurization of milk have practically eliminated milk as a source of infection in the United States.

Twenty years ago it was thought that the primary invasion of tuberculosis in childhood was a dangerous condition needing active treatment. Children were treated in institutions and special schools were established for their segregation and observation. As time elapsed and data accumulated it was found that a child with a primary infection did as well at home as one that was treated under a controlled regime. The excellent work of J. A. Myers et al.¹ at Lymanhurst, in Minneapolis, Minnesota proved conclusively this fact. He states, "Despite the fact that we had been strongly of the opinion that treatment is of value to the child with the first infection or primary type of tuberculosis, actual observations did not support our contentions."

The age of childhood, let us say from the age of 2 to 12 years, has shown a morbidity and mortality from tuberculosis that is less than other periods of life. According to the figures of the United States Bureau of Census, for the years 1930 to 1942, the average tuberculosis death rate per 100,000 population in the United States under the age of 25 was as follows:

Under one year	33.9
One to four years	17.00
Five to fourteen years	7.7
Fifteen to twenty-four years	50.6

We know from various sources that the figures on the development of re-infection tuberculosis vary considerably. They range from 0.5 to 10 per cent. In a follow-up of 1,000 children with primary infections at Bellevue Hospital, New York City, Dr. Edith Lincoln² reports 8 per cent of the survivors developed chronic pulmonary tuberculosis. Myers³ reports that in the study of groups of children who have developed a primary infection and who

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reach the age of 21, 10 per cent have already developed clinical disease.

These figures are large enough to make us consider with seriousness the primary infection of tuberculosis. While we do not need to use active treatment in the so-called benign primary phase, we do need to observe and check periodically positive reactors to tuberculin, as a good piece of work in preventive medicine.

It is known that the primary invasion of the bacillus may take place at any age. It was once thought to occur always in childhood. We now know that we can no longer use correctly the term childhood tuberculosis but must say tuberculosis in childhood.

The skin test and the x-ray have proven that many escape a tuberculous infection. In a business group of 126 adults, tested by the writer, whose ages varied from 21 to 61 years, the average being 35, 26 per cent were positive to the tuberculin test. The results of the testing of over 20,000 school children in Du Page County, Illinois, from 1938 to 1944 show a progressive drop in the incidence of positive reactors from 19.1 per cent in 1938 to 8.7 per cent in 1944. In another group of 12,000 high school students tested in these same years only 10.8 per cent were positive, with 12 cases of tuberculosis found on the first x-ray.

There may be many reasons for this progressive drop in the number of those allergic to the skin test. Some of these reasons are better knowledge of the disease, its prevention and treatment, wider application of modern methods of treatment, better economic and social conditions. There are probably others that are not as apparent.

In spite of this decline in the morbidity and mortality from tuberculosis, particularly in the United States, we still have with us a dangerous disease that may not be a major problem in the childhood years but that increases in morbidity and mortality as life advances for the child. In the age of puberty and on through the early adult years, that is from 15 to 45, it becomes the greatest cause of death. Because the reinfection phase of tuberculosis is not as prevalent in childhood and the primary invasion is benign, the supervision of children in some quarters has become lax. Chadwick⁴ states that in his investigation among 400,000 school children who were tested, the morbidity from adult tuberculosis in the reactor group was four times that of the non-reactor group, and the death rate in this group was three times as great as in the non-reactors.

Let us review briefly the primary invasion of tuberculosis. When the tubercle bacilli first enter the body they establish themselves in 85 per cent of the cases, in the lungs. They have a particular attraction for lymphatic tissue. The leucocytes immediately at-

tack and many bacilli are transported to nearby lymphatic glands.

Parrot⁵ states: "Every time that a bronchial gland is the seat of a tuberculous lesion, there is an analogous lesion in the lung." The lymphatic system bears the brunt of the first infection. The primary focus with its corresponding lymph glands becomes the primary complex. What does this primary invasion accomplish? After the incubation period of 4 to 6 weeks the phenomena of the primary complex are taking place. At the end of this period the individual has developed an allergy to tuberculo-protein. There may be quite an acute inflammatory process in the region of the primary complex. During this stage when the regional lymphatics are involved, there is some seeding of other organs by way of the blood stream. Usually there is no evidence, clinically, of this occurrence; but it is an important happening, as from these new foci may later come clinical disease.

In some instances, not many, when this scattering of the infection from the primary focus occurs there is an overwhelming infection leading to a generalized tuberculosis with death from meningitis. After the regression of the primary complex, which may take months to disappear, the individual seems no worse because of this happening. However in some a later phase develops. This phase may be called a secondary manifestation and can be mild with a tendency to heal, such as pleurisy, peritonitis or skin tuberculosis. It may be severe with a poor prognosis, such as miliary tuberculosis or meningitis. These secondary manifestations of tuberculous disease are often not recognized and are inadequately treated. Then later usually within a 2 to 3 year period we may see a third or reinfection phase of disease develop. Whether or not such reinfection is due to the breaking down of an endogenous focus or whether it is due to superimposed reinfection, the result pathologically would be the same.

All cases of reinfection do not pass through these secondary changes. The reinfection reaction of the body is different from the primary invasion. Here we have a disease with a chronic insidious and destructive behavior. The primary invasion may never progress but may regress leaving the individual with the scars of the complex in the lungs or other organs and sensitizing the individual to tuberculo-protein. In others the evidence of the complex may disappear even to the loss of allergy.

There is considerable difference of opinion on the role of allergy in the pathogenesis of tuberculosis. According to Myers: "Regardless of when it develops the first infection type leaves the body in a hazardous condition from the standpoint of the reinfection."

This primary invasion, in conferring an allergy on the individual, also confers an immunity. Pottenger⁷ states: "All sensitiza-

tion which is brought about by the first infection is generally accepted as being the first important link in the chain which represents immunity." He goes on to say, "Immunity in tuberculosis unfortunately is not a state of absolute protection from infection, but a relative protection." To discuss at length the various arguments for or against the value of the immunity conferred by a primary infection would be considerably beyond the scope of this paper. It can be said, however, that a primary infection does not confer sufficient immunity to prevent the reinfection phase from occurring. If we can prevent a primary infection, it is axiomatic that the destructive type of tuberculosis will not develop later. There are those who, believing in relative immunity, advocate the inoculation with B.C.G. vaccine. But if a positive tuberculin reaction is indicative of allergy and some degree of immunity and, as stated, this immunity does not protect from a reinfection of disease but predisposes the individual to an attack of a more dangerous type of infection, it would seem that conferring such an allergy would defeat the purpose for which it was given. Such inoculation also destroys our only means of detecting the actual invasion of tubercle bacilli in negative reactors who are exposed to open cases. On the other hand we know that in primitive races such as the Eskimos who have no so-called racial resistance to tuberculosis, since the advent of the white man into their domain, tuberculosis has taken a great toll. If we should develop a race of people with no contact with tuberculosis we might see a fulminating type of the disease occur. With this line of reasoning the seeding of the population with minimal doses of tuberculosis would serve as a protection. Robert Louis Stevenson is the authority for a story about a Marquesan tribe of superior physique that was reduced by tuberculosis in a single year from some 300 souls to a solitary pair of survivors.

This problem of the value of immunity conferred to peoples by contact with tuberculous disease may be answered in the not too distant future. If the incidence of infection continues to subside and a race of tuberculin-negative people populate the earth only history will tell us whether we will see this disease in epidemic form.

This so-called reinfection phase, or what has been incorrectly called adult tuberculosis, is the chronic pulmonary tuberculosis which creates our problems in treatment and serves to spread infection to others. It has a tendency to begin in the subapical region of the lungs where it may remain for many years in a subclinical state. It may even regress and disappear. If it progresses, anatomically it will involve the apical area when clinical evidence may be found.

During the presymptomatic stage physical signs or symptoms are absent. It is here that the tuberculin test and the x-ray play a very important part in the discovery of early lesions, before a chronic destructive process gets a start.

The work of the Selective Service System in taking x-ray films of all candidates for military service has unearthed thousands of cases of unsuspected tuberculosis. The writer on reviewing scores of films of rejectees has found evidence on the films of all stages of the development of tuberculous disease. Many had shadows that one might say were typical of tuberculous pathology but that on closer study were found to be non-tuberculous. Others with but little evidence on the x-ray film were found with active tuberculosis. Such cases need careful study before one reaches a conclusion. The x-ray film is only part of the picture. It may be necessary to use the sedimentation rate, the temperature chart, differential blood studies, animal inoculation, serial films, and extended observation to diagnose this insidious disease in its early phases. These facts only serve to emphasize the one fact that there are no pathognomonic signs, symptoms or x-ray film shadows that with certainty indicate tuberculosis.

SUMMARY

The primary infection of tuberculosis may occur at any age. Tuberculosis in infants has a relatively high mortality which subsides in childhood only to rise again in puberty. The sensitization conferred by a primary infection opens the way for a destructive phase of tuberculosis to develop. The value of the immunity conferred by a primary inoculation is not settled. Tuberculosis in its preclinical form is often difficult to diagnose. It is said that, "The child is father of the man," so a primary tuberculous infection is the sire of destructive disease. We should not neglect tuberculosis in children.

RESUMEN

La infección tuberculosa primaria puede ocurrir a cualquiera edad. La tuberculosis en la infancia tiene una mortalidad relativamente alta que desciende durante la niñez, pero que sube de nuevo en la pubertad. La sensibilidad que produce la infección primaria abre el camino para el desarrollo de la fase destructiva de la tuberculosis. No se ha establecido todavía el valor de la inmunidad producida por una inoculación primaria. El diagnóstico de la tuberculosis en su forma preclínica es frecuentemente difícil. Se ha dicho que "El niño es el padre del hombre," así la infección tuberculosa primaria es la progenitora de la enfermedad destructiva. No debe descuidarse la tuberculosis en los niños.

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Management of Minimal Tuberculosis

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The most striking phenomenon in tuberculosis control is the constant change of our attitude toward, and modes of, control. Although the disease itself does not change, our knowledge of the behavior of this disease is augmented as the years go on. Methods of control which were held in highest esteem are now obsolete in our present-day armament. The reason for this is quite evident, when we consider that we are now finding a new type of disease; that is, minimal tuberculosis, which really is a type of disease in itself.

In the not-so-far past, say about ten years ago, we were discovering tuberculosis in the following percentage groups: About 80 per cent of all cases discovered were in the far-advanced, 16 per cent in the moderately-advanced, and 4 per cent in the minimal stage. At the present time under tuberculin surveys, mass x-ray, and intensive contact control, we have the following percentages: 62 per cent in the minimal stage, 31 per cent moderately-advanced, and 7 per cent far-advanced. This gives us a tremendous increase in the minimal cases and has brought to us an immense problem; that is, how to treat these cases. There was a time, before we really had these cases available, when it was felt that the outlook for patients with minimal tuberculosis, as contrasted with the outlook for patients with advanced tuberculosis, appeared so favorable that it seemed almost sufficient to make an early diagnosis to insure satisfactory results.

Many of the reports of excellent prognosis in minimal tuberculosis have come from sanatoria where the outlook upon minimal tuberculosis is not the same as that in the clinics at the time of early diagnosis. In the Henry Phipps Clinic, Philadelphia, Pa., even though the most modern attitude towards seriousness of minimal tuberculosis is held, the results are astonishingly poor—almost half developed progressive disease.

How are we to avoid these rather bad results after working so hard to discover these early cases? The answer, I believe, lies in a comprehensive follow-up of the patient once a diagnosis is made.

In most diseases the prognosis of a diagnosed case can usually be made with accuracy, provided an etiological diagnosis is available. This condition does not exist in minimal tuberculosis. As

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you all are aware, not all cases behave in the same manner. Some will show a spontaneous clearing under little or no treatment; some will remain static; some will be slowly proliferative; some will be quickly exudative; and some will extend in a matter of a few days to moderately or even far-advanced cases.

When a diagnosis of minimal tuberculosis is made, it is not enough to know that it is caused by the tubercle bacillus or that the lesion is quite small; but to have a working knowledge of the probable prognosis of each case is an achievement to be desired. This is not simple nor can it be accomplished with one weapon. Rather a combination of all sources of information should be used. Every case of minimal tuberculosis is an individual problem and must be handled as such. Our aim is to determine as closely as possible whether the case is retrogressive, static, or progressive. This, I believe, can be accomplished by evaluating all of the following factors in each individual case of diagnosed minimal tuberculosis:

1. *Past History:* A definite history of close and prolonged contact to an open case of tuberculosis is a positive factor in favoring a progressive disease. A negative history or an absent history of contact, while only of value in a negative way, would bear upon the prognosis. A previous history of pleural effusion on a tuberculosis basis would definitely indicate progressive disease.

2. *Predisposing Factors:* An individual who is in the "teen-age" group is certainly much more inclined to progressive disease, than one who is much older. Sex is a factor only in that younger females develop progressive disease faster than the males of the same age-group. Difference in race is an important factor. The colored, Mexican, and Indian races usually have more progressive lesions than the white race. People engaged in hard manual labor are much more apt to develop a progressive lesion than those who are occupied in the so-called white-collar positions. The economic status deserves consideration. Those with a high economic status are much more liable to remain static than those who have a very low economic status. Co-existing diseases are a considerable factor. Syphilis, diabetes, and long-standing non-specific disease would produce a progressive disease.

3. *Present Complaint:* Patients who have symptoms such as cough, loss of weight, slight temperature, night sweats, loss of energy for quite a long while, and only a minimal lesion on x-ray have a very mild progressive lesion. Asymptomatic patients give no clue to the character of their lesion.

4. *Physical Findings:* The absence of physical findings gives no indication as to the nature of the lesion. However, should there

be present definite physical findings such as rales or altered breath sounds, then we can think of a progressive lesion.

5. *X-Ray*: The importance of x-ray examination does not cease when the diagnosis of tuberculosis is made. It now takes on a new role, that of recording changes in the existing foci or the presence of new lesion. Serial x-rays taken at six-week intervals will indicate change and hence the presence or absence of progressive lesions. It is a foolhardy man who will give a prognosis on the examination of a single x-ray film.

6. *Sputum Examination*: The presence of positive sputum indicates a progressive or active lesion. This can be obtained from direct smears or gastric washings.

A complete evaluation of the above factors will usually lead us in following three categories: (a) Active, progressive, unstable disease; (b) Lesions of doubtful significance; that is, we cannot determine whether or not activity is present; (c) Lesions where general score would indicate or suggest complete static or healed state.

The management of each group is definitely different. Lesions that are determined to be progressive demand active treatment. This means the instituting of collapse therapy and complete bed rest. This is best accomplished in a hospital or a sanatorium. Conditions may be present where hospital or sanatorium is not available. In such a case complete bed rest with collapse therapy at home is indicated. The treatment of lesions of doubtful degree of progression demands a realization that the lesion might become activated by home conditions. It is important that the patient be given the benefit of the doubt and have a period of rest with observation. Complete bed rest with serial x-rays will indicate whether there has been any progression. If there is no change in the x-ray appearance, it is now safe to consider these lesions as static.

All static lesions should be examined at two-month intervals. This type of treatment would be considered as observation with modified rest. The patient must be considered to be a potential case at all times and should have regular x-ray examinations at three-month intervals, as long as two to three years.

SUMMARY

There is no such thing as a routine treatment for minimal tuberculosis. It is equally absurd to say either that every case should receive pneumothorax or that collapse should never be used until the disease becomes moderately or far-advanced. Every case must be individualized, and this can be done only by a proper follow-up

to determine just what is happening in each case. As yet we have no test which will tell us just what the future potentialities of the case are. Only the tedious, difficult, close follow-up is now available; and using this method will give us the best results obtainable.

RESUMEN

No hay tratamiento rutinario para la tuberculosis mínima. Es tan absurdo decir que cada caso debe recibir neumotórax como que nunca debe emplearse el colapso hasta cuando la enfermedad esté moderadamente o muy avanzada. Debe individualizarse todos los casos, y ésto sólo puede llevarse a cabo mediante una observación adecuada a fin de determinar exactamente lo que está sucediendo en cada uno de ellos. Todavía no tenemos prueba alguna que nos diga exactamente cuál es la futura potencialidad del caso. Sólo contamos hasta ahora con la fastidiosa y difícil observación subsecuente íntima, y el empleo de este método nos dará los mejores resultados que se puedan obtener.

Pregnancy in Tuberculosis

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The private physician is still Keeper of the Keys of Health for the families of the nation, and his care of his private patients is the Master Key opening the way to the final solution of the tuberculosis problem. In the last analysis, his is the responsibility for the control of the spread of this disease and for its final elimination; and it is his duty to allay the morbid fears of his patient's family, to give expert advice, mental comfort and ultimate happiness by a proper and personal decision when particular emergencies arise.

One of the emergencies likely to occur during the treatment of a tuberculous woman is pregnancy. Great as the responsibility is in such a combination of events, it is still greater when active unsuspected tuberculosis is discovered in a woman who is pregnant. Another situation occurs when tuberculosis has been discovered and arrested and the couple desire a child and heir, and they consult their physician for advice on the proper procedure to follow to give them reasonable assurance that no harm will befall the prospective mother or offspring. In each of these situations the physician must have an answer that will give this assurance, and must have a definite and logical course to follow when they occur. The procedure to be followed in treating these patients requires the closest cooperation between and study by obstetricians and those skilled in the treatment of chest diseases, to properly preserve the lives of the mothers, conserve their health and insure a healthy future for the infants.

There is still some controversy concerning the effects of pregnancy on the course of active tuberculosis. This problem is notoriously difficult to submit to statistical analysis and the conclusions arrived at in articles published in the last thirty years, from both general practitioners and specialists, have shown a wide divergence of opinion, seemingly supported by statistics of the authors, as to the effect of pregnancy on the tuberculosis and as to the proper procedure to be followed when the two conditions coexist. However, the best observers know from practical experience that the effect of pregnancy on active tuberculosis is predominantly bad.

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Pregnancy does constitute a serious drain on the tuberculous woman. The fact that she gains weight and looks better during pregnancy is misleading to the clinician and constitutes one of the most puzzling phenomena in clinical medicine. There is something that carries the chronically ill and doomed woman through pregnancy until her function with regard to propagation of the species has been fulfilled and then allows her to die, sometimes quickly. Had this phenomenon not been observed in women with cancer, diabetes and pernicious anemia, one would be inclined to believe that in the case of tuberculosis it is due to a gradually increasing partial collapse effect of the pregnant uterus which causes an elevation of the diaphragm in the last half of pregnancy. For many years this has been considered as a possible benefit by giving a form of collapse therapy equivalent to a phrenic nerve operation, but recent investigation has disproven this theory. The elevated diaphragm of pregnancy is not comparable to the high immobile diaphragm of phrenic nerve paralysis. It moves about as much as a normal diaphragm, the respiratory excursion is not decreased and may possibly be increased, so that the lung is not immobilized as we formerly supposed.

Tuberculosis has moved from first place to seventh as a cause of death in the general population, but for child-bearing young women it still stands in first place. Twenty per cent of all deaths in this group are due to the combination of tuberculosis and pregnancy, a rate twice as high as the mortality from all puerperal causes; and modern medicine generally deplores the inter-currence of pregnancy in the tuberculous woman.

Nevertheless, there is no doubt that the gloomy picture displayed in the literature of both medicine and obstetrics a few decades ago and the statistics which supported this grey pessimism belong in a past era. With the advantages of early diagnosis and collapse therapy, the pessimism often expressed is no longer warranted and much of the harm that might have befallen these patients has been averted. When the management of both conditions is conducted properly and use is made of collapse therapy, sanatorium care, local anesthesia, Caesarean section, and improved treatment of all the possible complications of pregnancy and delivery, it gives a solid foundation on which the successful child-bearing of these patients may rest.

It has been shown by investigators at the Chicago Lying-In Hospital that ten times more unsuspected tuberculosis can be found in pregnant women by fluoroscopic and radiographic examination. Of nearly 11,000 patients examined, one woman out of one hundred had tuberculosis which had never been suspected.

The incidence of unsuspected tuberculosis is about three times the incidence of unsuspected syphilis in the same group.

From statistics of this and similar compilations it is conclusive that the existence of tuberculosis and pregnancy together is still one of the problems that face the obstetrician and the chest physician, and a search for tuberculosis in all pregnant women becomes an essential part of prenatal care.

The adoption of routine tuberculin testing early in pregnancy and radiographic examination of the reactors for pulmonary tuberculosis should be encouraged; and as tuberculosis control becomes more efficient the problem of finding the tuberculous pregnant woman will be simplified and adequate care can be provided earlier. Inclusion in the marriage laws of routine radiographic examination for tuberculosis as a requirement for a license to wed would decrease the morbidity rate of active tuberculosis comparable to the reduction achieved in syphilis.

The avoidance of pregnancy is the most important primary consideration for the tuberculous patient and her physician. No woman who has active tuberculosis should consider pregnancy for at least two years after complete arrest of her disease, or even longer if the treatment required to heal the lesion was difficult, or if there is even the slightest doubt in the mind of the physician. The diagnosis of arrest of the disease must be based on a very careful study of the entire progress of the case and must not be arrived at casually. Many tuberculosis patients appear to improve throughout pregnancy, only to show a decided tendency toward aggravation of a mild lesion or activation of a dormant lesion in the first few months after delivery. This type of case is especially hard to prognosticate and should be sufficient reason for a reserved attitude toward allowing a pregnancy.

Therefore, when matrimony is contemplated by a woman with active or latent tuberculosis a very careful study of her condition should be made before allowing the possibility of pregnancy, so as to be assured of a reasonable chance that her chest lesion will remain quiescent, that she can stand a labor—normal or modified—and that satisfactory supervision and treatment can be provided. On such a study alone can be based a recommendation for or against marriage. In some cases the type of tuberculosis together with the nature and severity of the lesion in other organs may indicate postponement of marriage until these disabilities are eliminated.

Sterilization should be considered where a slowly healing chest lesion is present, where a longer period than is deemed convenient must elapse before the marriage, or where there is uncertainty as to the outcome of the healing of the chest pathology. This

can be done through a small incision in the abdomen under local anesthesia, the tubes ligated, and the incision closed with no shock and practically no danger to the patient. In younger women with better chances of healing, or in those whose tuberculosis is of such nature that the indication for sterilization is less obvious, contraceptive advice including a properly fitted diaphragm is the better choice.

When pregnancy is suspected, every available diagnostic aid must be used to confirm its presence beyond doubt. Tuberculosis often interferes with normal menstruation, so that absence of the normal menstrual flow in a woman previously regular may not have the same diagnostic value as it would in a nontuberculous woman. Consideration must be given to other presumptive signs of pregnancy, such as breast changes, discoloration of the vaginal and cervical mucosa, dermal pigmentation and gastro-intestinal disturbance. The Friedman and other reliable tests may have to be employed to determine the true diagnosis.

If and when the diagnosis of pregnancy in the tuberculous woman or tuberculosis in the pregnant woman has been made, there need be no serious concern or panicky procedure. The course of action must depend upon a consultation between the obstetrician and the phthisiotherapist. There are two courses that can be followed, requiring the closest study and keenest judgment to arrive at a decision as to which is proper—either to permit the pregnancy to continue to delivery or to recommend its termination. The responsibility of terminating a pregnancy cannot be taken lightly when it may mean ending the career of a potential Lincoln, or Galileo or Burns, before he has even begun to breathe.

The study on the part of the obstetrician should disclose whether or not the evidence indicates the prospect of a long, difficult labor, a pregnancy complicated by serious depletion from nausea and vomiting, or whether serious damage to essential organs is present or expected later, and note should be made of any other factors depleting the patient's system. It should give information as to the dangers and difficulty of interrupting pregnancy under conditions present and the method suited to the case if it is decided to interfere. If pregnancy has continued to the point where the fetus is viable, he will have to decide when and how labor is to be induced, and foresee the obstetrical complications as they arise and direct their management. This information will allow the internist to judge the probable effect of the strain of pregnancy and delivery on the pulmonary lesion and make it possible to guard against advance of the disease.

On the part of the phthisiotherapist, many factors enter into determination of the prognosis of the individual case. The stage

and duration of the disease, the type and activity of the lesion, the patient's age, her morale, her mental capacity to cooperate in the treatment, and the nearness of sanatorium facilities are some of the factors that enter into the problem. Other than medical factors modify the picture, such as the physical and emotional strain which the mother endures in the care of an infant. This is particularly marked in those homes which cannot afford to hire adequate help or, in these war times, in homes where it is impossible to obtain assistance. All too often the health of even normal mothers is unable to withstand the increased load of work and responsibility.

When all these factors are given their proper study and thought it will rarely be found necessary to terminate pregnancy if use can be made of the facilities to control the disease during gestation, to insure proper delivery and to provide adequate postpartum care. This may mean continuous observation and treatment by a physician trained in the management of tuberculosis and should, preferably at least, mean sanatorium care or its equivalent for a longer or shorter period during and immediately after pregnancy. It may have to include premature delivery of the child, termination of the pregnancy just before viability of the fetus, or even the performance of therapeutic abortion.

The seriousness of pregnancy to the tuberculous woman is comparatively slight if these therapeutic measures can be successfully carried out; and, given good hospital care and skillful surgery at a properly selected time, the risk is minimal and well worth assumption to insure a much wanted offspring. Given a better and more intelligent understanding of the problems of each individual case, many infant lives that previously would have been sacrificed by therapeutic abortion to save the mother may be preserved, and the mother may emerge from her pregnancy experience (once looked upon as a most dangerous and unjustifiable happening), almost if not quite as safely as the nontuberculous obstetric patient. We can only require for her the same care imposed on all obstetric patients, viz., that her general condition shall be such that she can endure the changed bodily functions incident to her pregnancy and a competence of her organs to carry to a successful conclusion through the stresses of delivery and the postpartum period.

Early or minimal cases of tuberculosis do not offer a serious problem to the consultant when pregnancy complicates the treatment. It may be stated as an elastic rule, subject to individual modification, that in some cases of active minimal tuberculosis it is best to remove the pregnancy and let the woman have all her facilities for conquering the tuberculosis. When the cure of

her disease is complete, then and then only, let her bear children. In other cases, a group becoming larger as the result of early diagnosis and application of collapse therapy, therapeutic abortion may be withheld. The patient is immediately placed in a tuberculosis sanatorium for observation from six weeks to three months. If the lesion appears to be controlled by bed rest or a combination of bed rest and artificial pneumothorax, and if the erythrocyte sedimentation rate is satisfactory, the pregnancy may be allowed to proceed; but if the disease progresses under these conditions, interruption of pregnancy is indicated immediately, preferably before the end of the second month, followed by active tuberculosis therapy. It is better to interfere too soon than too late.

In the case of the woman with advanced tuberculosis the choice of treatment more often becomes a choice of preserving the life of either the mother or the child instead of saving both of them. If the woman wishes to risk all for a living child she should be allowed to do so in the interest of the fetus, since the prognosis for the mother is frequently poor irrespective of the pregnancy.

With collapse therapy even apparently hopeless cases can often be carried through a normal pregnancy and delivery, tuberculosis treatment being continued after delivery. By doing a phrenic crushing using greater than usual pressure, or phrenicectomy, by pneumothorax, and in selected cases holding the diaphragm by use of pneumoperitoneum after delivery, the prognosis is materially improved. The efficacy of collapse therapy may reduce the indications for therapeutic abortion in this type of case.

It has been shown that in some cases abortion may act as a stimulus to the chest lesion, and non-interference is at times the preferable choice for this reason. It may be felt after careful observation that abortion will mean death for both mother and fetus, while allowing progress of the pregnancy may mean only death of the mother, thus sparing the life of the child.

When pregnancy has advanced to the fifth or sixth month before the tuberculosis is recognized it is best to allow it to continue at least until the thirty-second week and then to terminate it by induction of labor or Caesarean section. The time for intervention is not always easy to determine, and depends on how well the mother is able to compensate for the additional strain of the later months of pregnancy. The longer the fetus can remain in the uterus with safety to the mother, the better its chances for living.

Fall states that it might naturally be supposed because of the absence of trauma that there should be no danger to the fetus in Caesarean section, and states that such is not the case. In a

fairly high percentage of cases there occurs following delivery of an apparently lusty baby a gradually progressive weakening of respiration with blue spells and finally death. Autopsy in these cases shows a marked atelectasis which so far has not been explained. The more premature the baby, the greater the danger of this complication.

The technique of delivering the tuberculous woman is one that must be carefully decided upon after close study of the individual case. A woman with a closed quiescent chest lesion, who has had adequate care during pregnancy, may receive the same treatment during labor as any other woman. Gas or intravenous anesthesia is preferred to ether to avoid the irritating effect of the latter agent. If the second stage of labor exceeds an hour, a forceps delivery is indicated to avoid unnecessary pain, exertion and exhaustion. Perineal block with a local anesthetic or caudal anesthesia may be used to relax the outlet, allowing delivery, spontaneous or instrumental, with the least general anesthetic, and allowing post-delivery repair without further general anesthetic.

Conservation of blood is to be encouraged so as to allow all possible help to the patient to battle her tuberculosis, and a supplemental blood or plasma transfusion may be indicated in some cases. Frequent blood studies for anemia during pregnancy may indicate suitable therapy and may disclose, before delivery, an indication for a transfusion so that compatible donors may be on hand in case of postpartum or pulmonary hemorrhage. The danger of even a small blood loss during labor in cases of anemia deserves serious consideration, since under the circumstances a loss of 200 or 300 cc. which ordinarily would be without danger, may prove rapidly fatal.

In no case should lactation be permitted, as it increases the hazard for the mother by using her recuperative and healing powers for the production of milk. If the lesion is kept well collapsed, and the sputum proven negative, it is not usually necessary to separate the mother and infant after delivery to prevent infection of the infant from the mother. If the sputum is positive, protection of the infant from infection is imperative.

CONCLUSIONS

The principles to be followed in the treatment of the tuberculous obstetric patient can be stated in the following items:

First: No one has shown definitely that pregnancy is good for the health of a tuberculous woman in any type or stage of tuberculosis. A neutral effect of pregnancy on a tuberculous lesion is not asked; the risks are too great.

Second: Most investigators, easily 75 per cent, believe that preg-

nancy can, or does, aggravate tuberculosis, while no one has proven that abortion properly performed, early, will be likely to aggravate an early or arrested lesion, if proper tuberculosis therapy is followed afterward.

Third: Every one admits that pregnancy places a severe strain on a tuberculous woman's resources and strength, and that labor is fraught with immediate and remote perils not present in a normal woman.

Fourth: After labor or abortion, treatment for the chest disease should be carried on vigorously, must be continued over sufficient time to guarantee arrest and should not be discontinued too early. In any event, only after careful observation and study by an experienced phthisiotherapist should subsequent pregnancies be allowed and only after careful study of the history and findings have shown the chest lesion to be completely arrested or under complete control.

Fifth: If therapeutic abortion is decided upon it should be done as early as possible, with spinal or gas anesthesia, and a technique adopted to give as rapid delivery of the fetus as possible.

Sixth: After the fourth month of gestation the effect of intervention is comparable to a full term delivery but with proper collateral care in those that have not shown an acute flare up earlier, the risk can be safely assumed, the obstetrician being ready to interfere as soon as labor starts, so as to terminate it rapidly, as by forceps, sparing the patient the stress of inhalation anesthetics. In selected cases labor may be induced after the thirty-second week.

Seventh: The best prognosis for mother and child in any case depends on the close cooperation between the obstetrician and the phthisiologist, with a careful evaluation of the chest lesion and the obstetrical problems involved to insure individualization of treatment for each case according to the conditions that prevail.

Eighth: Every tuberculous woman must have an individual audit of the assets and liabilities present before a decision is made allowing her to become pregnant.

Ninth: Every woman should have a chest diagnosis before marriage and every pregnant woman must have a tuberculin test and/or x-ray study of the chest made early, so that the proper procedure may be followed in her care during pregnancy, delivery and aftercare.

CONCLUSIONES

Los principios que deben observarse en el tratamiento de la paciente obstétrica tuberculosa pueden ser establecidos en los párrafos siguientes:

Primero: Nadie ha demostrado definitivamente que la preñez es beneficiosa para la salud de la mujer tuberculosa en ningún tipo o período de la tuberculosis. No es suficiente que la preñez tenga un efecto neutral sobre la lesión tuberculosa, pues los riesgos son demasiado grandes.

Segundo: La mayor parte de los investigadores, quizás el 75 por ciento, opinan que la preñez o agrava o puede agravar la tuberculosis, mientras que nadie ha demostrado que el aborto temprano, correctamente ejecutado, corre mucho riesgo de agravar una lesión temprana o estacionada, si se sigue después una terapia tuberculosa apropiada.

Tercero: Todo mundo admite que la preñez constituye una carga muy severa sobre las fuerzas y recursos físicos de la mujer tuberculosa, y que el parto está lleno de peligros inmediatos y remotos que no se presentan en la mujer normal.

Cuarto: Después del parto o del aborto, el tratamiento de la enfermedad pulmonar debe ser llevado a cabo vigorosamente, debe ser continuado por suficiente tiempo para asegurar el estacionamiento de la enfermedad y no debe ser suspendido demasiado pronto. Sea lo que fuere, no deben permitirse preñeces subsiguientes sino después de cuidadosa observación y estudio de parte de un tisioterapeuta experto, y después de que el estudio cuidadoso de la historia y los hallazgos haya demostrado que la lesión pulmonar está completamente estacionada o bajo completo control.

Quinto: Si se decide ejecutar un aborto terapéutico, éste se debe llevar a cabo tan pronto como sea posible, usando anestesia gaseosa o espinal, y debe adoptarse una técnica que permita el parto del feto tan rápidamente como sea posible.

Sexto: El efecto de la intervención después del cuarto mes del embarazo es comparable a un parto al fin de la gestación; pero se puede tomar el riesgo sin novedad, con la propia atención colateral, en aquellos pacientes que no han sufrido antes una recaída aguda de la enfermedad. En estos casos el especialista en obstetricia debe estar listo a intervenir tan pronto como comience el parto a fin de terminarlo rápidamente, como con forceps, para evitar a la paciente el esfuerzo de la anestesia de inhalación. En casos seleccionados se puede inducir el parto después de la trigésima segunda semana.

Séptimo: El mejor pronóstico para la madre y el niño en cualquier caso depende de la cooperación íntima entre el especialista en obstetricia y el tisiólogo, con un avalúo cuidadoso de la lesión pulmonar y de los problemas obstétricos implicados a fin de asegurar la individualización del tratamiento en cada caso de acuerdo con las condiciones prevalecientes.

Octavo: Cada mujer tuberculosa debe ser sometida a un recuento de las ventajas y desventajas presentes, antes de decidir si se le puede permitir el embarazo.

Noveno: A toda mujer se le debiera hacer un diagnóstico pulmonar antes del matrimonio, y a toda mujer embarazada se le debe hacer una prueba tuberculínica o un estudio radiográfico torácico temprano, o ambos, a fin de poder determinar el correcto procedimiento que se debe observar en su cuidado, tanto durante la preñez y el parto como después del parto.

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Chemotherapy of Tuberculosis

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Modern creative chemistry has given to modern medicine and surgery man's most valuable weapons with which to combat disease. Only very short intervals of time elapse between the announcements of new compounds. We are all familiar with developments in the sulfonamide group of compounds and have seen the more effective and, at the same time, less toxic derivatives of sulfanilamide replace those previously used. Similarly, we saw (and used) arsphenamine, then witnessed the introduction of neoarsphenamine and other derivatives of that substance. How eagerly have we watched the work with penicillin—first produced in 1939, lost in the enthusiasm over the sulfonamides, and then rediscovered in the search for something better than the sulfonamides. Today we are on the threshold of an adequate civilian supply of penicillin and this substance is proving to be of utmost value in saving the lives of our fighting men.

The time allotted for this discussion will not permit a review of the many attempts, in the past, to control tuberculous disease chemically. However, out of the work with sulfonamide compounds, searching for a substance better than sulfapyradine to combat pneumonia, came another group of compounds referred to as the sulfones. The first compound in this group, namely, diamino diphenyl sulfone, when tested in laboratory animals, demonstrated a striking ability to control the tuberculous disease in these animals. From diamino diphenyl sulfone, referred to as the parent compound, several derivatives were developed and in turn tested in tuberculous guinea pigs. While the parent compound possessed a decided therapeutic effect it was also extremely toxic. The derivatives have been found to be less toxic. Some of the derivatives are somewhat less effective therapeutically and some have shown no ability to control tuberculous disease in animals.

Clinical investigations have been carried out and reported in which human tuberculosis was favorably influenced by the administration of promin (P,P'diamino diphenyl sulfone-N,N'dextrose sodium sulfonate). This compound was administered to several groups of patients and recorded observations by Hinshaw and Pfuetze, and others have appeared in the literature.^{1,2,3}

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My active interest in such investigations was aroused when an opportunity presented itself to test clinically the effect of another sulfone, namely, diasone (disodium formaldehyde sulfoxylate diamino diphenyl sulfone)* This compound was shown by Feldman⁴ to be less toxic than the parent compound (diamino diphenyl sulfone) when fed to experimental animals. Callomon⁵ demonstrated it to be somewhat less toxic and only slightly less effective in animals than was promin. I have found diasone to be less toxic in humans than was promin, and therefore have carried its administration to patients much further than I had carried promin.

Hinshaw and Pfuetze have used another sulfone derivative, namely, promizole, in clinical tuberculosis but have not reported their observations.⁶

From my experience with diasone over a period of 18 months and in a group of 170 persons, with all stages and manifestations of tuberculosis, I have made a number of observations and formed very definite opinions. The methods of administration, reactions, and factual observations on an initial group of patients were reported in September, 1943.⁷ Subsequent observations and additional data were reported in November, 1943.⁸ Since that time other investigators have begun to administer diasone and a goodly number of reports on their experiences have become available.⁹

From the data at hand, several pertinent statements can be made: 1. Reactions to the compound for the most part are not severe, can be readily controlled by withholding the drug, and no permanent injuries to tissues or organs have been demonstrated. 2. Dermatitis of quite severe proportions is the one reaction which has been reported and considered serious in a half dozen cases. An example of such reaction is reported by Dr. Karl Pfuetze.¹⁰ I have observed two patients with less severe dermatitis.

3. Pulmonary tuberculous lesions of the exudative type have shown favorable response for the most part, exceeding that obtainable without the administration of diasone. Lesions that were predominantly fibrotic or fibro-cavernous either have not been favorably influenced or were so affected only slightly. Large or thick walled cavities must still be attacked surgically.

4. In one patient of our series, an acute exacerbation of disease occurred while she was receiving diasone, after having shown improvement for 60 days.

5. Eighty per cent of a small group with genito-urinary and osseous tuberculosis (all but two patients), have shown symp-

*Product supplied thru courtesy of Dr. J. F. Biehn, Medical Director, Abbott Laboratories, North Chicago, Illinois.

tomatic improvement as well as radiographic and laboratory evidence of control.

6. A few cases of tuberculous and mixed infection empyema have likewise been favorably influenced.

I have not attempted to break down our series of cases into classification of disease, length of treatment, follow-up, etc., in order to prepare tables and statistics. Rather, I have chosen to add the unpublished observations of others to those which have been made in our institution, thus arriving at some generalizations regarding the status of chemotherapy in tuberculosis today.

Predominantly exudative pulmonary lesions, particularly the earlier and less extensive disease, have shown resolution and become sputum negative, in the majority of cases. These changes have occurred sooner than would have been anticipated with conventional therapy.

Patients with large unilateral cavitation and clear contralateral lung have been carried thru thoracoplasty without "spill over" into good lung. Likewise, those who had fresh bronchogenic spreads in contralateral lung were carried thru thoracoplasty and progressively improved the fresh lesion.

A number of advanced cases and a few of those less involved showed either no change or became worse while receiving diasone.

Rapid and pronounced decrease in urinary tract symptoms, disappearance of tubercle bacilli from the urine and an increase in general well being, have followed the administration of diasone to patients with unilateral and/or bilateral renal involvement as well as bladder involvement.

Sanatorium stay has been reduced by one-fourth to one-half that experienced generally prior to this investigation. The majority of patients discharged have resumed active roles in industry and half of them continued to take diasone at work. Thus hospital dollars have been saved and beds released for others. Post sanatorium follow-up has as yet been very short, too short in most cases. However, of the patients discharged as arrested, and those who have apparently experienced maximum benefit, following diasone administration, less than 2 per cent have had re-activation of their lesions.

The administration of diasone to patients afflicted with clinically active tuberculosis has proven to be an intriguing and stimulating investigation. The whole hearted cooperation of my director of nurses (Lucille Majors, R.N.), and her staff, in administering the compound and recording data; the interest and diligence displayed by my secretary and laboratory workers (Helen Olson, Edna Kotilinek and Jean Powers), in correlating data and completing exhaustive laboratory and x-ray studies; the willing-

ness of patients to be "test animals"—all these have made continuation of this study possible.

CONCLUSION

It is my impression, now, reinforced by personal reports from other observers (unpublished data), that diasone and two other sulfone derivatives, provide us with an invaluable adjunct to conventional tuberculosis therapy. The experiences of yesterday and today will lead us to new and better derivatives, to new groups of compounds or to improved methods of administration which will in turn enhance our ability to conquer tuberculosis.

CONCLUSION

Mi opinión actual, apoyada en comunicaciones personales de otros observadores (datos inéditos), es que la diasona y dos otros derivados de los sulfones nos suministran un auxiliar inestimable a la terapia convencional de la tuberculosis. La experiencia pasada y presente nos conducirá a nuevos y mejores derivados, a nuevos grupos de compuestos o a mejores métodos de administración, los que a su turno acrecentarán nuestra habilidad para conquistar la tuberculosis.

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Indications for Collapse Therapy

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The indications for collapse therapy in the treatment of tuberculosis, simply stated, are—an active pulmonary lesion. Collapse therapy has come to the front as the most effective treatment of pulmonary tuberculosis and ahead of the older measures of rest, fresh air, diet, and climatic change. There is little difference of opinion about the effectiveness of collapse therapy as determined by clinical observation, but a satisfactory explanation of the "why's and wherefore's" of these benefits is not easy.

The theory that the added rest is the important factor has little to appeal to me. Cavity closure is unquestionably important. Changes in circulation and lymphatic drainage in the collapsed lung may have something to do with the benefit. However, the theory as first propounded by the late Dr. Breidenbach, of Dayton, and stressed by the late Paul Coryllos, of New York, that a relatively anaerobic condition is present in the collapsed lung which is unfavorable to the development of the tubercle bacillus, which is an aerobe, is the theory that most reasonably explains the benefit of collapse treatment, in my opinion.

It is a mistake to believe that collapse treatment alone can bring about the arrest of pulmonary tuberculosis. A patient must have some resistance as evidenced by his ability to form fibrous tissue to encapsulate the tubercles and lay down calcium. In spite of adequate collapse the disease will be progressive in certain cases with spread of the disease to various parts of the body. We have no explanation for this factor of resistance, but it can be estimated to some degree by consideration of the clinical manifestations and the study of the character of the pulmonary lesion on the x-ray film.

The patient with poor resistance often runs a high temperature, shows a progressive weight loss, develops early evidences of extrapulmonary complications. The pulmonary lesion is often extensive and progressive, and has a soft diffuse appearance on the x-ray film. The patient with a relatively good resistance often exhibits few evidences of toxemia, shows some tendency to improve under ordinary sanitarium regime, and x-ray studies reveal the lesions to be more discrete, with some retrogression and tendency towards fibrosis and calcification. While use of collapse is

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quite justifiable in the former group, good results cannot be anticipated. In the latter group good results will be obtained. Although it is quite true that some of this latter group may go on to spontaneous healing, the largest percentage, particularly if cavity formation is present, will slowly go on to progression and fatal termination if collapse measures are not applied.

Every case of active pulmonary tuberculosis should be considered for lung collapse. The primary tuberculosis of childhood does not respond as well as the adult type, probably because these patients have a low inherent resistance against the disease. Patients above the age of sixty often have a chronic healing tuberculosis and their lives are probably not appreciably prolonged by collapse measures. However, some of these should receive collapse, particularly from the point of view of stopping the spread of the infection to others.

Unfortunately many cases present themselves for treatment, in which their general condition and the extent of pathology prohibit the effective administration of collapse measures. If more than half of both lungs are involved it is, in general, impossible to collapse the disease effectively and still maintain normal respiratory function. Extensive extrapulmonary tuberculous lesions contraindicate collapse therapy, while minor degrees of involvement do not necessarily contraindicate such therapy. Following control of the major source of infection, tuberculous laryngitis and tuberculous enterocolitis frequently go on to healing. Serious nontuberculous complications, particularly cardiac and pulmonary diseases, may likewise prohibit application of collapse measures.

The object of all collapse measures is to bring about a purely mechanical collapse of the lung, particularly the diseased areas, and these collapse measures are effective in direct proportion to their technical efficiency. Pneumothorax is most widely used in collapse measures because of its relative safety and simplicity, and because it often brings about an effective collapse. Thoracoplasty is probably the most successful collapse measure because it achieves most nearly a perfect technical result and because this collapse is of a permanent nature.

Collapse of the Minimal Case

Increased use of various types of x-ray survey has led to the recognition of a larger number of minimal tuberculous lesions in recent years than in the past. A certain number of these may recover under rest treatment. However, as shown by Turner and Collins of the Chicago Municipal Tuberculosis Sanitarium, a considerable number of these cases will extend and become advanced cases. In minimal cases treated with pneumothorax there

were almost no evidences of extension of the disease as far as these cases had been followed. It is my opinion that active minimal lesions of pulmonary tuberculosis should be promptly subjected to collapse therapy measures and these measures kept in effect for a considerable period of time. Although there is some difference of opinion as to which collapse measure should be resorted to, I lean strongly in favor of pneumothorax if this is possible.

*Unilaterally Moderately Advanced and Far Advanced
Pulmonary Lesions*

Unilaterally moderately advanced and far advanced lesions present ideal undisputed indications for prompt collapse treatment. The impelling factor is the presence of a cavity. Pneumothorax is almost always attempted first, but if unsuccessful should be quickly supplemented by surgical measures. In certain cases with extensive lung destruction permanent surgical collapse is preferable to a pneumothorax collapse even though pneumothorax may be possible.

Bilateral Pulmonary Lesions

Twelve or fifteen years ago bilateral cases were not given benefit of collapse treatment. However, at the present time various combinations of collapse therapy measures can be employed to collapse both lungs simultaneously or alternately. It is necessary to remember that at all times adequate respiratory function must be maintained, and this means that both lungs can be collapsed only partially and that many extensive bilateral processes cannot be thoroughly collapsed, and therefore must be excluded from treatment.

Certain special indications for collapse such as pulmonary hemorrhage are frequently mentioned, but it is my opinion that the fundamental and impelling indication for collapse is merely the presence of an active pulmonary lesion. Discussion of the choice of collapse therapy measures does not seem to be within the scope of this assignment.

CONCLUSION

Collapse therapy is often dramatically effective, producing results comparable to the best recognized medical and surgical procedures, and although not free from dangers and complications should be applied promptly upon recognition of the diseased process. It will, I believe, remain the foremost therapeutic measure in the treatment of pulmonary tuberculosis until such a time

when the disease has been eradicated by the control of the source of the infection or when some agent is introduced which will specifically influence the tubercle bacillus in the body.

CONCLUSION

La colapsoterapia es frecuentemente eficaz en forma espectacular, produce resultados comparables con los más aceptados procedimientos médicos y quirúrgicos y, aunque no está exenta de peligros y complicaciones, debe aplicarse con prontitud al diagnosticarse el proceso morbozo. Soy de opinión que ella continuará siendo la terapia más importante en el tratamiento de la tuberculosis pulmonar hasta cuando se haya erradicado la enfermedad mediante el control de la fuente de infección, o hasta cuando se introduzca algún agente que ejerza una influencia específica sobre el bacilo tuberculoso en el cuerpo.

Recent Advances in Bronchoscopic Technic^{*}

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The brilliant advances of thoracic surgery in recent years have presented a challenge to bronchoscopists. Greater accuracy and detail of information, segmental localization of lesions, and endoscopic assistance in surgical procedures indicate the trend of endoscopic needs. This has resulted in improvements in bronchoscopic instrumentarium and technic which make it possible to obtain the data requested in an increasingly higher percentage of cases.

Of primary importance is the recognition and universal acceptance of the segmental division of the lungs, with the corresponding branch bronchi leading to each. The use of a standard terminology, such as that suggested by Jackson and Huber,¹ by both the surgeons and bronchoscopists aids greatly in mutual discussions and descriptions of findings.

Instrumentarium: One of the most important improvements in instrumentarium is the Negus² bronchoscope which uses a combined proximal and distal³ lighting system to provide the advantages of both types of lighting in a single instrument. The advantage of proximal lighting is that the bronchus far ahead of the bronchoscope is always well illuminated; the instrument with this lighting system is an excellent instrument for bronchoscopic diagnostic problems. Its disadvantage, eliminated through the use of distal lighting, is due to its weight and to the fact that the introduction of forceps or aspirator immediately places the field in shadow. By combining the two lighting systems, Negus has preserved the advantages of both; in this instrument the proximal light has been made small enough to add little weight to the instrument and thus it permits almost the same ease of manipulation so advantageous in the Chevalier Jackson bronchoscopes.

Two new infant bronchoscopes^{3,4} have been added to the bronchoscopic instrumentarium which facilitate bronchoscopic examinations in the newborn infant. These utilize extremely small lamps and light carriers and provide a lumen adequate for examination of the tiny trachea and bronchi of infants.

Other improvements in instrumentarium have been designed

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to facilitate the removal of tissue from suspected pulmonary neoplasms and to permit inspection of otherwise bronchoscopically-inaccessible bronchi. The retrograde telescopes⁵ providing visualization of the upper lobe bronchi are instruments in the latter category. These have their own source of illumination and with a retrograde lens give a satisfactory view of the principal branches of the upper lobe bronchi. The telescope may be inserted into any of the bronchoscopes ordinarily used for adults. New forceps have been added to bronchoscopic instrumentarium and former types have been changed to meet certain specific biopsy problems. The delicate forceps used for removing small ball-bearings from the bronchi serves most adequately for teasing tissue from a tumor rather than biting it off as does the more routinely used punch forceps.⁶ While the use of this forceps for obtaining tissue for biopsy was suggested many years ago, it is by no means universally used and since it is of such great value for this procedure it is mentioned here again. Roberts⁷ suggested elongating the laryngeal cup forceps to bronchoscopic length, and this has adequately filled the requirement of a side-biting forceps. These two forceps are the most useful of all bronchoscopic biopsy forceps. Stitt⁸ has developed a curved flexible upper lobe forceps that may be used to remove tissue 1 to 2 cm. inside the orifices of the upper lobes. The guidance of these procedures is facilitated, of course, by the bi-plane fluoroscope, an advance in bronchoscopic technic that is not new in foreign body work but which has been utilized only rarely as an aid to other bronchoscopic procedures.

Bronchoscopic cinematography⁹ has been developed in recent years and represents an advance in teaching as well as in recording living bronchial pathology. The exceptional visualization obtained through the photographic bronchoscope suggests that improvements in the design of bronchoscopes and lighting systems have by no means reached their end.

Anesthesia: Satisfactory anesthesia is one of the most important factors in any bronchoscopic procedure. No single agent is adaptable to all cases. Consequently, each new agent receives many trials, and upon individual successes or failures it may be broadly acclaimed or condemned. Thus intravenous barbiturates were at first briefly considered the final answer to endoscopic anesthetic problems. Almost immediately, however, the contra-indications became apparent as respiratory spasm, induced as the tube touched the larynx, was found to be an alarming side effect. In some instances in which a general anesthetic is desired, an intravenous barbiturate may be still employed provided an adequate local anesthetic is administered first. This combination must be used

with caution but, with the maintenance of an adequate airway by the bronchoscope itself, can be very satisfactorily controlled. Curare is another new agent whose use in addition to local anesthesia is of advantage in unusually difficult cases.¹⁰ It affords relaxation but has no actual anesthetic effect and consequently may be used only in conjunction with thorough local anesthesia.

Technic: A significant change in bronchoscopic technic which has become routine in many clinics is the introduction of the Jackson-type bronchoscope directly into the trachea without first exposing the larynx with the laryngoscope.¹¹ The primary purpose of the laryngoscopic exposure prior to the insertion of the bronchoscope was to permit the introduction of the sterile bronchoscope directly into the trachea without contamination by mouth secretions. Of secondary importance is the fact that laryngoscopic exposure of the larynx is easier than the search for the larynx with the bronchoscope because the laryngoscope affords a very much larger field to visualize landmarks as the introduction of the tube proceeds. This advantage is nullified if the endoscopist has had sufficient training to make this wide exposure unnecessary.

Therapy: From the standpoint of therapy the principal advances in bronchoscopy have been the rather wide-spread use of chemotherapeutic agents intrabronchially. Some clinics have reported considerable success through the intrabronchial insufflation of the sulfonamides, while others have warned against their use. Apparently, however, the intrabronchial concentration of the drug can be maintained on a higher and steadier level by oral administration than by bronchoscopic administration. The disadvantage of the powder becoming caked in the bronchus by intrabronchial insufflation must likewise be borne in mind. Penicillin, intrabronchially, on the other hand, seems to have a greater effect than the sulfa drugs, but an evaluation of the various methods of its administration is still being carried out.

SUMMARY

Recent advances in bronchoscopy consist of new equipment, methods of anesthesia and therapeutic procedures. Outstanding in new equipment are the combined distally and proximally illuminated bronchoscopes, new biopsy forceps, retrograde bronchoscopic telescopes for upper lobe examination, smaller infant bronchoscopes for examining the bronchi of the newborn, and equipment for bronchoscopic cinematography. In anesthesia the use of curare has proved of great assistance in certain difficult cases. The elimination of the laryngoscope in the standard bronchoscopic procedure further facilitates bronchoscopic technic. Ther-

apeutically the use of the sulfa drugs and penicillin intrabronchially has proved of great value and has opened a new field for research. The use of a standard terminology such as that recently suggested by Jackson to correlate the segmental divisions of the lung with their respective branch bronchi has been of great assistance in discussions between surgeons, internists and bronchoscopists.

RESUMEN

Los recientes avances en la broncoscopia comprenden nuevos aparatos, métodos de anestesia y procedimientos terapéuticos. Entre los nuevos aparatos se destacan los broncoscopios que combinan la iluminación próxima y la distante, nuevas pinzas para biopsias, telescopios broncoscópicos retrógrados para el examen del lóbulo superior, broncoscopios más pequeños para examinar los bronquios de los recién nacidos y equipo para la cinematografía broncoscópica. El uso de curare en la anestesia ha resultado de gran ayuda en ciertos casos difíciles. La eliminación del laringoscopio en el procedimiento broncoscópico corriente facilita aún más la técnica broncoscópica. En la terapéutica, el uso intrabronquial de los sulfanilamidos y de la penicilina ha resultado muy valioso y ha abierto un nuevo campo de investigación. El uso de una terminología uniforme, como la que recientemente ha propuesto Jackson para poner en correlación las divisiones segmentarias del pulmón con sus respectivas ramas bronquiales, ha sido muy útil en discusiones entre cirujanos, internistas y broncoscopistas.

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The Treatment of Bronchiectasis

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Discussions about bronchiectasis usually revolve about three aspects: 1) pathogenesis, 2) pathology and clinical picture, and 3) therapy. Because these three have been so frequently associated, it is difficult to treat one aspect of the problem without bringing the other two into the discussion.

The question of whether bronchiectasis represents a congenital or acquired disease has been discussed many times. It is now pretty generally agreed that some types bear all the criteria of congenital lesions whereas others are certainly the result of known etiological factors. Cystic bronchiectasis, or the so-called cystic disease of the lung, would fall into the first group, that of the congenital malformation probably caused by a defect in the embryonic development associated with excessive growth of the bronchial ramifications and the production of large cyst-like spaces as soon as air is admitted into the lung.

In the second group would fall the saccular and cylindrical bronchiectasis. The pathogenesis of this acquired bronchiectasis is a complex made up of partial obstruction of the bronchus, infection of the bronchial wall, and cough. This was discussed by Coryllos and shown experimentally by Weinberg and further proven by the frequent association of atelectasis and bronchiectasis as discussed by Anspach, Richards, Kleb, and others. The sequence of events would most likely follow this pattern—a partial obstruction of a bronchus caused by a foreign body, tumor, bronchial secretion, spasm, or a combination of these factors associated with or caused by infection of the mucous membrane and bronchial wall distal to the obstruction and associated with or causing acute or chronic spasmodic cough. This group of circumstances makes possible a constant infection in the bronchus, and subsequently in the lung parenchyma associated with that bronchus.

Marked changes in pressure occur due to the cough, followed by eventual distention and breaking down of the walls of the bronchi because of this infection and pressure, with atelectatic and fibrotic areas replacing the normal architecture of the lung parenchyma. If this process is acute the changes are marked and rapid, yielding the saccular type of bronchiectatic disease.

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In a slowly developing lesion over a long period of years, the effect is more diffuse and the type of bronchiectasis cylindrical. Thus are produced the permanent and irreversible anatomical changes which represent the pathological entity of bronchiectasis.

On this basis it is customary to remark that so long as this lesion remains, the patient will suffer from cough with profuse and foul expectoration, frequent and recurring pneumonic infections and dangers of hemorrhage, amyloidosis, and metastatic spread. It is for this reason that surgery is so often recommended as the only method of producing an adequate cure.

Arising out of thoracic surgery itself has come a new medical concept of the clinical problem of bronchiectasis. With the popularizing of thoracoplasty in the treatment of tuberculosis it was noted that all patients showed a rather marked degree of saccular and cylindrical bronchiectasis in the collapsed lung after surgery. On x-ray examination, particularly with the use of contrast substance, this extreme pathology made some people predict serious clinical consequences of this operation. However, it was pointed out by Ornstein that despite this x-ray picture and despite the unquestioned presence of the pathological entity of bronchiectasis these patients did not show the clinical picture of that disease. In fact, the typical signs of cough, purulent and foul expectoration, and frequent recurring pneumonic disease were not seen in these post-thoracoplasty patients. Ornstein stated that the lack of infection plus the adequacy of drainage was responsible for this situation, and furthermore that bronchiectasis as a disease entity required inadequate drainage and the presence of infection

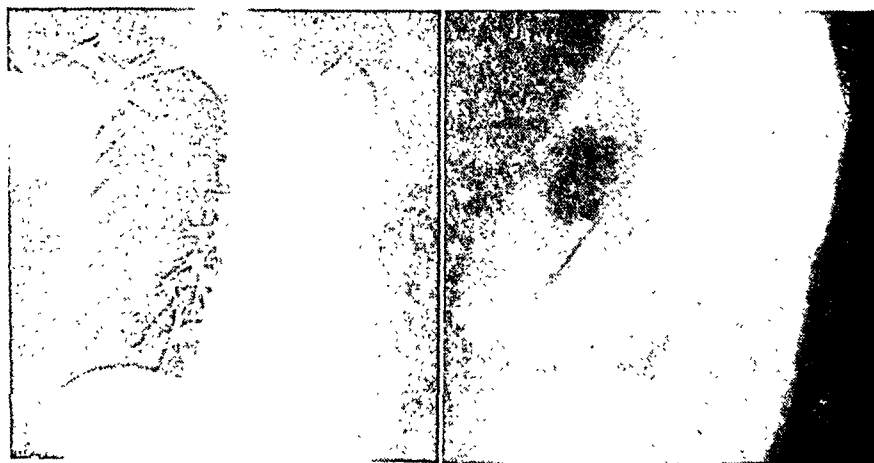


Fig. 1, Case 1

Fig. 2, Case 1

Fig. 1, Case 1: R. O. Bronchography done on patient 15 years following left thoracoplasty. Saccular areas of bronchiectasis are observed in the collapsed lung.—Fig. 2, Case 1: R. O. Lateral x-ray showing saccular bronchiectasis existing in collapsed lung following thoracoplasty.

in addition to anatomical changes. All of us who have observed a large number of post-thoracoplasty patients have had similar experience and are well acquainted with the great difference between the anatomical picture and the condition of the patient. A typical case is the following (Figs. 1 and 2):

Case 1: R. O. This is a 33 year old female who had a thoracoplasty in three stages in 1930 for an extensive, far advanced tuberculosis. She made an uneventful recovery and has been well ever since. On investigation she and her family report that her colds are very infrequent and that otherwise she has neither cough nor expectoration. Bronchography, however, shows an extensive and marked bronchiectasis in the collapsed lung.

In the light of this finding, certain other information, which has also been common knowledge, takes on a new and added importance. Upper lobe bronchiectasis, cystic and saccular in nature, whether it be congenital, acquired in early infancy, secondary to tuberculosis, or other upper lobe atelectasis, seldom causes much trouble. In fact, this type of disease may exist throughout a patient's life and be picked up on routine x-ray or during the course of an examination for some other condition. It is not uncommon for such upper lobe bronchiectasis to be mistakenly diagnosed as tuberculosis, largely because of the lack of symptoms. The reason for this lies in the good drainage which the upper lobes possess, and in the fact that this is so often a cystic type of disease with little or no obstruction to secretion. Such a situation is demonstrated by the following:



Fig. 3, Case 2



Fig. 4, Case 3

Fig. 3, Case 2: C. H. Cystic bronchiectasis, probably congenital in nature, which has never produced symptoms. This patient was mistakenly diagnosed as tuberculous.—*Fig. 4, Case 3: L. T.* Bronchography of left apical bronchiectatic lesion known for 20 years. Cylindrical bronchiectasis of left base is recent in origin and caused the symptoms as reported.

Case 2: C. H. A 52 year old white male who was x-rayed as a contact case. The x-ray shows a very extensive right upper lobe bronchiectasis with neither cough nor expectoration or other symptoms. This patient has been followed for some years in a tuberculosis clinic because of these shadows (Fig. 3).

Case 3: L. T. This was a patient of 59 years with severe cough and expectoration. Examination showed the marked cystic bronchiectasis of the upper lobe which she declared was first diagnosed some twenty years earlier and thought to be tuberculous at the time, but she insisted that her cough and expectoration were only of two years duration. Bronchography showed in addition to this upper lobe lesion, a mild cylindrical lesion in the lower from which arose the symptom complex that brought her to the hospital (Fig. 4).

The marked difference between the upper lobe bronchiectasis and lower lobe bronchiectasis in the same patient is an indication of the importance of adequate drainage in this disease. The fact that bronchial obstruction is such a regular occurrence in the production of this disease would suggest its elimination as essential to the cure. Bronchogenic carcinoma, foreign body, thick secretion of whooping cough, asthma, and some bronchopneumonias are all frequently followed by the development of bronchiectasis. The only factor that all these conditions have in common is bronchial obstruction. It is very logical, therefore, that no projected therapy will be of very great value unless it removes this obstruction, no matter what else it may do. The most definite method of performing this and removing the disease as well is,



Fig. 5, Case 4

Fig. 5, Case 4: M. L. A 21 year old girl with left lower lobe saccular bronchiectasis.

of course, surgical excision of the affected portion of the lung. This is of great value when bronchiectasis is limited to a lobe or to one lung, but it accomplishes very little when the lesion exists widespread or involves more pulmonary tissue than can be safely removed. The following cases show the differences in the various results from surgery.

Case 4: M. L. A 21 year old girl, treated for sinusitis and post-nasal drip by various doctors in various clinics for 19 months. She was examined and found to have extensive saccular bronchiectasis of the left lower lobe. She had copious, foul, purulent expectoration. The remainder of the lung was found to be free from bronchiectasis. A left lower lobectomy was done, and her symptoms cleared up almost immediately following the operation (Figs. 5, 6, 7).

Case 5: A. P. This patient, a 37 year old male, showed a saccular bronchiectasis of the left lower lobe and a small amount of a similar lesion in the upper lobe and the right lower lobe. Because of the extensive lesion in the left lower lobe, excision of that lobe was performed. The patient made a normal recovery; however, his cough and expectoration continued, and now, some ten years later, shows progression with marked and extensive sacculation of the left upper, right lower, and mid lobes (Fig. 8).

It is quite obvious that this disease like any other irreversible, purulent condition is a definite indication for surgical therapy, but it is just as obvious that this therapy cannot be done in a majority of the cases. Other procedures in addition to surgical excision, such as thoracoplasty, pneumothorax, phrenicectomy have the very definite disadvantage and contraindication of interfering with the drainage of the bronchi. These procedures are only successful in bronchiectasis that does not require treatment.



Fig. 6, Case 4

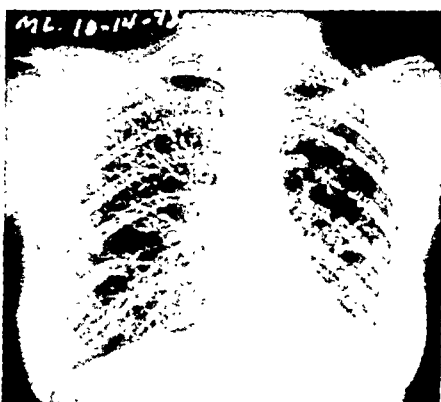


Fig. 7, Case 4

Fig. 6, Case 4: M. L. Lateral view showing extensive saccular dilatation.—
Fig. 7, Case 4: M. L. Complete bronchography showing absence of bronchiectatic changes in other bronchi of both lungs.

It remains, therefore, to apply some medical management to the vast majority of bronchiectasis. The approach depends upon the realization that we shall not attempt to alter the anatomical structure, but that our efforts shall be devoted to the establishing of drainage, removal of infection, and to regaining as much of the normal physiology of the bronchi as is possible.

Drainage is secured by posturing of the patient when no definite obstruction exists. Postural drainage means that position in which the areas of the bronchi involved are most successfully drained. Sometimes this is obtained by hanging a patient upside down; however, there are other occasions when this particular position does not produce the desired effect due to the topography of the infected region. In some cases it is necessary for the patient to lie on his left side, or his right side, or his back at various angles of inclination. In fact, as we have seen before, the upper lobe drains best in the upright position. Whatever position is adequate must be used, and such drainage should be done at that time when the secretion has collected most—on awakening in the morning and before retiring at night as well as late in the afternoon and at any other time when it is indicated. This should be done for a minimum period of 15 minutes at a time. It is likewise advisable to use some substance to decrease the viscosity of the sputum and to enable it to flow more freely and thus to drain



Fig. 8, Case 5

Fig. 8, Case 5: A. P. Extensive saccular bronchiectasis in left upper and right lower lobe several years after left lower lobectomy for similar lesion.

more rapidly. Ammonium chloride is such a medication. In cases of anaerobic infection the inhalation of a high concentration of oxygen is of definite value because of its inhibitory effect upon anaerobic bacteria. The results of such therapy may be illustrated by the following case:

Case 6: H. C. A 54 year old bricklayer suffered from cough with profuse expectoration, recurrent respiratory infection and severe dyspnea that had rendered him completely incapacitated for a period of four years. His x-ray (Figs 9 and 10), showed annular shadows suspicious of cystic bronchiectasis in the left mid-lung field with marked emphysema below. Bronchography bore out the impression of a cystic area, but showed in addition marked cylindrical dilation in both lower lobes. He was placed on postural drainage with medication for cough and expectoration. At the end of one week he reported that he was breathing more easily, and as he continued this simple therapy, his cough decreased and finally disappeared, and he found himself once again able to walk and climb stairs without any marked dyspnea. After several months of constant care and general rebuilding he was able to return to work and now works full time at a semi-sedentary occupation.

Bronchoscopy is frequently of value in helping to produce drainage; however, the bronchoscope can seldom reach the level where the pathology really exists. The indication for bronchoscopy exists, nevertheless. In the younger age levels the question of foreign body must be considered and in the older group, tumor must be ruled out. The condition of the bronchial mucosa will frequently give an indication of the chronic changes which have taken place

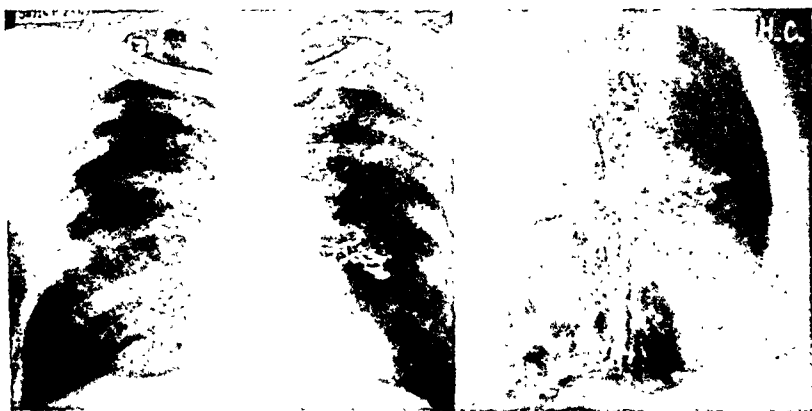


Fig. 9, Case 6

Fig. 10, Case 6

Fig. 9, Case 6: H. C. Areas of cystic bronchiectasis in left mid-lung field and cystic bronchiectasis behind heart shadows at both bases.—*Fig. 10, Case 6:* H. C. Lateral x-ray demonstrating cystic bronchiectasis of lower portion of the left upper lobe and cylindrical bronchiectasis of left lower and right mid-lung.

and serve as a guide to the length of the treatment period required before any marked change would be expected.

Radiation was suggested for bronchiectasis by Berck in 1934 and has become quite a vogue in certain quarters. This is capable of producing considerable relief in certain types of bronchiectasis particularly where chronic infection will respond to radiation, but in a great many cases it is at best an adjunct to other medical therapy.

The appearance of the sulfonamides and other chemotherapeutic agents opened new possibilities in treatment; however, the use of the sulfonamides by mouth has been in general disappointing, and the use by injection at best uneven. We need not look far for the reason for this. The different types of organisms frequently include bacteria not sensitive to sulfonamides; in such cases we would not expect to have good results. Secondly, in a great many well-established cases of bronchiectasis the blood supply at the site of infection is extremely small, and consequently, the presence of a drug in the blood does not necessarily imply that it is present at the site of infection. The very chronicity of these lesions has made sulfonamides dangerous to use in bronchiectasis. Penicillin appears to be of very much greater value, and it remains to be seen just how far its application will go. In certain types of cases a marked relief is obtained, and in others very little effect of any sort is noted. This is again dependent upon the type of bacteria present and in the amount of circulation around the area. Direct inhalation of penicillin appears much more promising.

SUMMARY

To summarize the treatment of bronchiectasis we may say that:

1. The anatomical changes seen on the x-ray or on the post mortem table are not the most important factors. Inadequate drainage and persistent infection are necessary for the clinical entity of bronchiectasis.
2. Upper lobe lesions and other types with adequate drainage seldom require much or any therapy.
3. Treatment may be surgical with removal of the diseased area only when it is sufficiently limited to make such total removal possible.
4. Medical treatment is needed for the majority of cases. This is designed to create drainage and remove infection.
5. Chemotherapy is not as yet developed into a definite weapon against this disease.

RESUMEN

Para resumir el tratamiento de la bronquiectasia podemos decir que:

1. Las alteraciones anatómicas que se ven en la radiografía o en la mesa de autopsias no son los factores más importantes. El drenaje inadecuado y la infección persistente son esenciales para producir la entidad clínica de la bronquiectasia.

2. Las lesiones de los lóbulos superiores, y otros tipos con drenaje adecuado, sólo raramente requieren mucha terapia o, en verdad, terapia alguna.

3. Puede emplearse el tratamiento quirúrgico de extirpar la zona afectada, solamente cuando está lo suficiente limitada para permitir la excisión total.

4. En la mayoría de los casos se necesita el tratamiento médico, que tiene por objeto producir drenaje y extirpar la infección.

5. La quimioterapia no es todavía un arma positiva contra esta enfermedad.

Surgical Procedures in Non-Tuberculous Diseases

RALPH B. BETTMAN, M.D., F.A.C.S.*

Chicago, Illinois

A lecture such as this must confine itself to basic facts because of sheer inability to pack more than that into the allotted time. An audience such as this is as well acquainted with the basic facts as I am so you can see the dilemma I am in. I will compromise, therefore, with the title and I will discuss with you the subject of the importance of making the physicians in general in this country understand that intrathoracic conditions which require surgery are as amenable to surgery as if these conditions were in other parts of the body.

In the first place there seems to be a fixed opinion that intrathoracic organs are inaccessible. The average physician still seems to think that an intercostal incision or a rib resection is a formidable procedure and gives but poor access. We must try to make him realize that rib resection is actually as feasible for the chest as any of a number of abdominal wall incisions is for the peritoneal cavity. We must make him realize that not only can we get as good an exposure of the diseased organs as if it were in the abdomen, but often a much better exposure because we do not have the problem of packing off intestines.

Furthermore we must make him realize that the healthy pleura is as resistant to infections as the peritoneum. In conjunction with this last statement I wish to say that from my short experience with Penicillin we are going to find it remarkably helpful in preventing empyema following thoracic operations. The tremendous pleural reactions, sero-sanguineous effusions, which we see after topical application of the sulfas seems to be absent.

Finally, regarding incisions, we must convince the physicians in general that a rib resection is not necessarily deforming nor disabling.

Regarding the understanding of the physiology of respiration we in this group have a definite obligation to act as instructors. We must make physicians realize that in order to maintain necessary respiratory function during operation we need no apparatus other than the gas mask and gas machine which is used today in almost any hospital for almost any operation. Of course you and I and anyone doing chest surgery would prefer a specially

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trained anaesthetist; of course in certain cases tracheal intubation is desirable; and of course high pressures, etc., should be avoided, but many other operative procedures require equally specialized techniques, for example, goitres, long intra-abdominal procedures in the presence of heart disease, to mention only a few. All of us who have done chest surgery have been called upon to do so now and then in hospitals where the anaesthetist has never before given an anaesthesia in the presence of an open chest and as far as my own experience is concerned have gotten along very nicely with the apparatus and personnel at hand. We must make the general physician understand that we are able to cope with the anaesthesia, with the wide open thoracotomy during operation and with the residual pneumothorax or hydrothorax (if any) after operation without interfering with the patient's ability to absorb oxygen and excrete carbon dioxide.

Furthermore we must teach the profession in general that nature has been as profligate with pulmonary tissue as with, let's say, kidney tissue and that an individual is as capable of continuing life with the loss of half of one as half of the other. Many physicians seem to think that the ligating of either the right or left pulmonary artery throws an insurmountable burden on the heart. That this is not so has of course been proven over and over again clinically and before that experimentally.

The importance, size and close relative position of the anatomical structures which the surgeon has to deal with when operating in the mediastinum, on the esophagus or in the hilus of the lung seems to throw abject fear into the hearts of the uninitiated. This perhaps is all to the good in keeping the pseudo surgeon away. I am reminded of a time when I was dissecting a mediastinal tumor and looked up at one of the internes who was holding the lung out of the way. His forehead was covered with beads of perspiration. I thought he might be sick and asked him if he wanted to leave the table. "No," he said, "I am alright," but he continued "we sure are working where there is a powerful lot of living."

A knowledge of local anatomy is necessary for any surgery. A knowledge of local anatomy is what protects the ureter in the resection of a carcinoma of the caecum, or the common duct in a complicated gall bladder operation. The brachial plexus seemed to me, as a student, the most complicated structure imaginable. After I had demonstrated it many times, as an instructor, it seemed simple. The mere fact that the vessels in the mediastinum are large and important means only that like any other tissues you have to know where and what they are and handle them gently.

Let us just hurriedly run over a few intrathoracic conditions which cry for surgical intervention and which are denied this intervention because of lack of knowledge or of prejudice—a redundant figure of speech as far as I am concerned.

Here is a picture of a diaphragmatic hernia—a hiatus hernia. This man has had the usual symptoms for years. Six months before I saw him he nearly died from a gastric hemorrhage. The physician who saw him made the correct diagnosis and explained very learnedly to his family that the ulcer from which his bleeding came was a not too unusual a complication of esophageal hiatus hernia but he added, "The danger from an operation is so great that I would not be operated upon myself and, therefore, would not so advise you to." The only reason I finally did get the patient was that he was brought into Michael Reese Hospital moribund from a second hemorrhage and the interne, who was not as shackled with prejudices to thoracic operations as the gastroenterologist, sent him up to my service. He was operated upon sometime later—after several blood transfusions—and made an uneventful recovery.

Another not too infrequent condition in point is the following: Here is a woman who has had dysphagia for some time and a diagnosis of a tumor of the lower end of the esophagus and upper end of the stomach. Her internist said to her that if the lesion were any place else in the intestinal tract except where it was he would certainly advise an operation for removal of the tumor.

Her son was a medical student who had been on my service as a clinical clerk and brought his mother to me. We resected a portion of the esophagus and cardia containing a well localized lesion through an transthoracic incision anastomosed the esophagus to the remaining stomach. The patient made an uneventful convalescence and now, about two years after operation, is in good health and has gained back all the weight she had lost. I, of course, cannot promise that she will not have a recurrence but at least she is symptom-free at present.

The next case demonstrates a type of medical ignorance of which I hope we will see less and less: A man in his fifties started off with a cough, continuous and difficult to control. The physician had an x-ray made which showed a lesion near the hilus of the left lung which the roentgenologist diagnosed as probably malignant. The patient was sent to a bronchoscopist who could see nothing in the bronchus but who told the physician that that fact did not rule out a malignancy. The patient was sent to Arizona for a few months and then treated with x-rays, sedatives, etc., until a marked dyspnea developed and signs of a massive effusion were present. He was tapped and tumor cells found in the fluid obtained. Then

when he was obviously inoperable the patient was sent to me. At the time of his first x-ray a pneumonectomy might have been feasible. When we questioned the physician about the delay he said, "If this suspicious lesion had been in the abdomen I would have recommended an exploratory laparotomy but I thought the danger of an exploratory thoracotomy would be too great."

The next two cases, almost identical in signs and symptoms demonstrate a more logical and rational approach to the subject of intra-thoracic tumors. In the first instance the exploratory thoracotomy did no harm, in the second it was life saving.

The first case, that of a middle aged woman, shows this large well defined mass in the right chest. It was small two years ago and has grown to this present size. There are no symptoms except for an occasional cough which sometimes is "brassy". The patient was being treated by a member of this society. Because of four plus Wasserman and Kahn reactions and a definite history of lues the diagnosis of aneurism had been made. When in spite of good anti-leuitic treatment the mass continued to grow, the physician decided that an exploratory thoracotomy was indicated, this especially in view of the fact that the x-ray picture was not typical. I will admit that I thought that the diagnosis of a mediastinal tumor was more likely than aneurism. The chest was opened through an anterior incision and the large mass was easily visualized, and when the hand was placed around it, it was immediately recognized that the pulsation was not transmitted but was expansile. A small needle was inserted into the mass and the diagnosis of aneurism of the ascending aorta was confirmed. The chest was closed and the patient was returned to her room. A week later the patient left the hospital after a convalescence as benign as one could hope for, after any exploratory laparotomy.

A few weeks later another case presented itself with almost the same x-ray picture and the same symptoms. This time the diagnosis of mediastinal neoplasm was the correct one—a teratoma. The tumor was easily removed and with it a condition which was threatening the life of the patient.

(Dr. Bettman demonstrated several other types of non-inflammatory, non-tuberculous intrathoracic lesions which are amenable to surgery. These are omitted so as not to prolong the article).

SUMMARY

Undoubtedly the greatest difficulty which confronts the patient with a surgical condition of the chest today is the ignorance of the profession as a whole as to what surgery can accomplish, and the reluctance of the great mass of physicians to appreciate this.

I hope that I may outlive the day when a medical man will come to me and say: "Doctor, I have a patient who I think has carcinoma of the lung, but I have advised against operation because the mortality is too high." When I ask such a man whether or not his medical mortality of 100 per cent isn't the acme of high mortality, he places the responsibility in the lap of the gods and complacently absolves himself of all responsibility. I have shown you roentgenograms this morning, and described histories of patients with pathological conditions of the lungs, bronchi, mediastinum, esophagus and pleura—that is the various component parts of the chest except the heart, which, for lack of time, I omitted. I have shown you that in certain instances we can make a definite diagnosis early and that in certain other instances it is impossible to make a definite diagnosis early, just as it is impossible to make a definite diagnosis of a breast tumor without a frozen section, or at times to distinguish between a common duct stone or an early carcinoma of the head of the pancreas without an exploratory laparotomy; and I hope you all leave here with the understanding that an exploratory thoracotomy is just as simple as an exploratory laparotomy, and as necessary. As a surgeon I wish to tell you that we have the anaesthetic facilities for wide open thoracotomy, that we have the techniques well developed for attacking pathological conditions found in the various components of the chest and that we know from the point of view of physiology that it is as possible to deprive the body of certain amounts of thoracic viscera as it is of certain amounts of abdominal viscera. Our results in surgery of the chest as in surgery of the abdomen, everything else being equal, vary with the type of disease and in most cases with the promptness with which the patient is brought to surgery. For example, the reports of cures from cancer of the lung after pneumonectomy compare favorably with the reports of cures from cancer of the stomach after gastrectomy.

In short, Gentlemen, we should be able to give patients with certain lesions of the chest the same break, the same chance that they would have if their lesions were situated in the abdomen. But this is far from the case. There remains among physicians a tremendous amount of educational work still to be done, before this can be accomplished. You Gentlemen, the physicians in this society, must be the apostles.

You who have kept abreast of the development of therapeutics of chest diseases and therefore know what surgery has to offer, must help us surgeons in teaching our fellow physicians who have not kept pace with the growth of medical knowledge in this direction.

RESUMEN

Es indudable que la mayor dificultad que confronta hoy el paciente con un estado quirúrgico del tórax es la ignorancia de la profesión en general de lo que puede realizar la cirugía, y la resistencia de parte de la mayoría de los médicos de darse cuenta de ello. Tengo esperanzas de vivir hasta el día en que me venga a ver un médico y no me diga: "Doctor, tengo un paciente que yo creo que tiene carcinoma del pulmón, pero he aconsejado que no se opere porque la mortalidad operatoria es demasiado crecida." Cuando le pregunto a tales médicos si no es cierto que su mortalidad médica del 100 por ciento es el colmo de la mortalidad elevada, ellos le hechan la culpa al Destino y complacientemente se absuelven de toda responsabilidad. Esta mañana les he mostrado roentgenogramas y les he relatado las historias de pacientes con estados patológicos de los pulmones, bronquios, mediastino, esófago y pleura, es decir, de las varias partes componentes del tórax con la excepción del corazón que, por falta de tiempo, he omitido. Les he demostrado que en ciertos casos podemos hacer tempranamente un diagnóstico bien definido y que en otros casos es imposible hacer temprano un diagnóstico bien definido, lo mismo que es imposible hacer el diagnóstico bien definido de un tumor del seno sin un corte congelado o, a veces, distinguir entre un cálculo del conducto biliar común y un carcinoma precoz de la cabeza del páncreas sin una laparotomía exploratoria; y abrigo la esperanza de que, antes de irse, todos ustedes entiendan que una toracotomía exploratoria es exactamente tan sencilla, y tan necesaria, como una laparotomía exploratoria. Como cirujano, quiero decirles que tenemos las facilidades anestésicas para ejecutar toracotomías abiertas de par en par, que contamos con técnicas perfeccionadas para atacar los estados patológicos que se presentan en los varios componentes del tórax y que sabemos que, desde el punto de vista fisiológico, es tan posible despojar al cuerpo de ciertas cantidades de vísceras torácicas como de ciertas cantidades de vísceras abdominales. Si todo lo demás es igual, nuestros resultados en la cirugía del tórax, como en la cirugía del abdomen, varían de acuerdo con el tipo de enfermedad y, en la mayor parte de los casos, con la prontitud con que se someta al paciente a operación. Por ejemplo, los informes de curaciones de cáncer del pulmón después de neumonectomía, se comparan favorablemente con los informes de curaciones de cáncer del estómago después de gastrectomía.

En resumen, Caballeros, deberíamos poder ofrecerles a pacientes con ciertas lesiones del tórax la misma oportunidad, la misma esperanza, que tendrían si sus lesiones estuvieran situadas en el

abdomen. Pero éste no es el caso, ni con mucho. Antes de que ésto se realice queda todavía por hacerse entre los médicos una labor educativa formidable. Ustedes, Caballeros, los médicos de esta sociedad, deben ser los apóstoles.

Ustedes que se han mantenido al corriente del desarrollo de la terapéutica de las enfermedades del tórax y que, por consiguiente, saben lo que ofrece la cirugía, deben ayudarnos a nosotros, los cirujanos, a enseñar a aquellos de nuestros colegas que no se han puesto al día del progreso de los conocimientos médicos en esta dirección.

104 South Michigan Blvd.

ELEVENTH ANNUAL MEETING

Executive Council Meeting

The members of the Executive Council of the College met at the Palmer House, Chicago, on June 16, 1945. The meeting was called to order by Dr. Jay Arthur Myers, Minneapolis, President of the College, and the following members of the Executive Council were present:

Dr. Charles M. Hendricks, El Paso, Texas
Dr. Paul H. Holinger, Chicago, Illinois
Dr. Louis Mark, Columbus, Ohio
Dr. Richard H. Overholt, Brookline, Mass.
Dr. Joseph C. Placak, Cleveland, Ohio

Major General S. U. Marietta, the seventh member of the Executive Council, was unable to attend the meeting because of military duties.

A brochure containing the reports of the Councils and Committees and the agenda for the meeting of the Board of Regents scheduled for the following day, was prepared for each member of the Executive Council and these matters were studied and discussed by the Council and recommendations made to the Board of Regents in order to expedite the business at hand.

The meeting was called to order at 2 p. m. and adjourned at 6 p. m. A dinner for the members of the Executive Council was tendered at the University Club, Chicago. Dr. Paul H. Holinger, Chicago, was in charge of the arrangements for the dinner.

Board of Regents Meeting

The Board of Regents of the College met at Chicago, Illinois, U. S. A., on June 17, 1945 to conduct the business affairs of the College. The chairmen of the College Councils and Committees were invited to come to Chicago in order to present their reports. These reports have been published in this issue of "Diseases of the Chest" and members of the College who wish to comment on any of the reports are requested to write to the chairmen of the respective Councils and Committees.

The meeting was called to order at 2:00 p. m. by Dr. Joseph C. Placak, Cleveland, Ohio, Chairman of the Board of Regents and the following Regents and guests answered present:

Dr. Andrew L. Banyai, Wauwatosa, Wisconsin
Dr. Benjamin L. Brock, Waverly Hills, Kentucky
Captain Robert E. Duncan, USN, Washington, D. C.
Dr. Edward W. Hayes, Monrovia, California
Dr. Charles M. Hendricks, El Paso, Texas
Dr. Paul H. Holinger, Chicago, Illinois
Dr. William A. Hudson, Detroit, Michigan
Dr. Minas Joannides, Chicago, Illinois
Dr. Edwin R. Levine, Chicago, Illinois
Dr. C. Howard Marcy, Pittsburgh, Pennsylvania
Dr. Louis Mark, Columbus, Ohio
Dr. Jay Arthur Myers, Minneapolis, Minnesota
Dr. William E. Ogden, Toronto, Ontario, Canada
Dr. Richard H. Overholt, Brookline, Massachusetts
Dr. J. Winthrop Peabody, Washington, D. C.
Dr. Joseph C. Placak, Cleveland, Ohio
Dr. Nelson W. Strohm, Buffalo, New York
Dr. James H. Stygall, Indianapolis, Indiana
Dr. Paul A. Turner, Louisville, Kentucky

The meeting adjourned at 5:15 p. m. and the members of the Board of Regents were guests of the Illinois Chapter of the College at a dinner given in their honor at the Stevens Hotel, Chicago, Illinois. Dr. Fred M. F. Meixner, Peoria, Illinois, President of the Illinois Chapter of the College presided at the dinner and he introduced the guests.

Report of the Secretary-Treasurer

The books of the College have been audited by the La Salle Audit Company, Chicago, Illinois and the following is abstracted from their statement.

The cash on hand was verified by actual count and by an examination of the petty cash vouchers. The organization carried one checking account at the First National Bank of Chicago, which on April 30, 1945, has the following balances:

General Fund	\$27,316.30
Life Membership Fund	1,380.00
Endowment Fund	250.00

TOTAL \$28,946.30

The cash in bank was verified by direct communication with the First National Bank of Chicago, and by reconciling the book balance with the amount certified to by the depository. Following is a summary of cash transactions for the fiscal year ended April 30, 1945:

BALANCE MAY 1, 1944 \$20,458.54

RECEIPTS:

New Membership Fees and

Collections Toward Fellowship \$ 6,940.00

Dues 15,321.25

Accounts Receivable:

Advertising, Subscriptions \$7,423.00

Less: Disc. Allowed 744.63 6,678.37

Special Fund 1,125.00

Chapter Funds Received 403.75

Miscellaneous Income 10.02

Interest Rec'd. on Government Bonds 250.00

Life Membership Fees 1,380.00

TOTAL CASH RECEIVED 32,108.39

TOTAL CASH AVAILABLE \$52,566.93

DISBURSEMENTS:

Purchase of Furniture and Fixtures \$ 27.84

Chapter Funds Refunded 226.25

Membership Certificates 105.48

All Other Expenses \$23,268.00

Less: Disc. Earned 6.94 23,261.06

TOTAL CASH DISBURSEMENTS \$23,620.63

BALANCE APRIL 30, 1945

General Fund	\$27,316.30	
Endowment Fund	250.00	
Life Membership Fund	1,380.00	
		<hr/>
TOTAL		\$28,946.30
		<hr/>

The actual expenditures during the fiscal year ended April 30, 1945 were \$2,502.84 less than the budgeted expenditures. This amount was set aside as a publication fund to be expended during the coming year. The chapter fund account has been examined and it has been found that the amount due to chapters to April 30, 1945 amounts to \$337.50. Following is a summary of the changes that took place in the general fund account:

BALANCE APRIL 30, 1944	\$24,601.52	
Less: Transfer to Endowment Fund	10,000.00	\$14,601.52
		<hr/>
Add: Net Income for Year		2,201.26
		<hr/>
BALANCE APRIL 30, 1945		\$16,802.78
		<hr/>

BALANCE SHEET — APRIL 30, 1945

ASSETS

ENDOWMENT FUND:

Cash in First National Bank of Chicago	\$ 250.00	
United States War Bonds	10,000.00	
		<hr/>
TOTAL ENDOWMENT FUND		\$10,250.00

LIFE MEMBERSHIP FUND:

Cash in First National Bank of Chicago	\$ 1,380.00
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GENERAL FUND:

Cash in First National Bank of Chicago	\$27,316.30	
Cash on Hand	25.00	
Accounts Receivable	166.50	
Furniture and Fixtures	1,035.32	
		<hr/>
TOTAL GENERAL FUND		28,543.12
		<hr/>
TOTAL ASSETS		\$40,173.12
		<hr/>

LIABILITIES AND SURPLUS

LIABILITIES:

Collections Toward Fellowships	\$ 4,325.00
Fellowship Fees Collected (Pend. Exam.)	2,500.00
Special Fund	2,019.00
Publication Fund	2,502.84
Chapter Funds	337.50
Accrued Expenses	56.00

TOTAL LIABILITIES\$11,740.34

SURPLUS:

General Fund Surplus	16,802.78
Endowment Fund Surplus	10,250.00
Life Membership Fund Surplus	1,380.00

TOTAL LIABILITIES AND SURPLUS\$40,173.12

STATEMENT OF INCOME AND EXPENSE

YEAR ENDED APRIL 30, 1945

TOTAL INCOME	\$28,822.21
TOTAL EXPENSE	24,118.11
NET INCOME	\$ 4,704.10
Less: Provision for Publication Expenses	2,502.84
NET INCOME FOR YEAR	\$ 2,201.26

ANNUAL FINANCIAL REPORT COLLEGE CHAPTERS

REPORT FOR FISCAL YEAR ENDED APRIL 30, 1945

Chapter	Cash Receipts	Cash Disbursements	Balance on Hand
California	\$261.49	\$ 32.68	\$228.81
Illinois	98.37	7.91	90.46
Michigan	40.00	28.13	11.87
New England States	19.75		19.75
New Jersey	247.74	23.61	224.13
New York	290.00	270.00	20.00
North Midwest	33.00	8.00	25.00
Ohio	78.92	11.80	67.12
Pennsylvania	84.30	32.05	52.25
Rocky Mountain	87.70	49.34	38.36
Southern	459.82	117.86	341.96
Texas	53.00	10.80	42.20
Wisconsin	21.20	9.75	11.45
TOTALS	\$1775.29	\$601.93	\$1173.36

RESOLUTION AUTHORIZING RENTAL OF A SAFE DEPOSIT BOX

The American College of Chest Physicians has accumulated securities in the nature of War Savings Bonds, and it is anticipated that there will be other securities purchased by the American College of Chest Physicians, Inc. In order to secure the safe-keeping of these bonds and other securities belonging to the American College of Chest Physicians:

BE IT RESOLVED: That the Board of Regents meeting in annual session at Chicago, Illinois, on June 17, 1945, hereby authorize the renting of a safe deposit box in a recognized safe deposit company, and that the following officials of the College, the Secretary-Treasurer, accompanied by the Executive Secretary, have access to this box.

INVESTMENT OF LIFE MEMBERSHIP FUND

BE IT RESOLVED: That the Board of Regents of the American College of Chest Physicians meeting in annual session at Chicago, June 17, 1945 authorize the investment of all monies in the Life Membership Fund in United States Savings Bonds, Series G.

BE IT FURTHER RESOLVED: That any and all interest accrued from this investment be placed in the general fund of the College, and that the principle of this fund be kept intact.

Paul H. Holinger, M.D., Chicago, Illinois
Secretary-Treasurer.

Upon motion by Dr. Hendricks, seconded by Dr. Hayes, the report of the Secretary-Treasurer was accepted by the Board of Regents and the Resolutions authorizing the rental of a safe deposit box and the investment of Life Membership Funds were unanimously adopted.

Report of the Executive Secretary

Introduction:

Like many other organizations the College has been confronted, during these trying war years, with many difficult and complex problems. That we have progressed despite these difficulties is indeed worthy of note. The Executive Secretary of the College wishes to pay his respects, at the outset of this report, to the officials and to the other faithful workers of the College whose counsel and advice have guided him through these difficult days. Without their loyal support and advice, it could not be possible to make this report of progress.

Finances:

Five years ago this month the College opened its offices in Chicago. On June 1, 1940 there was \$3,871.25 on deposit; at the close of our fiscal year June 1, 1945, our deposits of cash and bonds rose to \$39,168.63; a net gain of \$35,297.38.

Membership:

On June 1, 1940 there were 577 members of the College. On June 6, 1945 there were 1,766 members of the College, an increase of 1,189 members. The membership of the College during the past five years has been

gradually extended into many other countries, and today it is the largest, world-wide society of qualified chest specialists.

College Chapters:

The first College chapter was organized on May 21, 1940. Since then 24 College chapters have been formed. There is now a complete network of chapters in the United States and many chapters exist in other countries. Additional chapters of the College in some of the other countries are now in the process of organization, and we hope to be able to report the formation of these chapters at an early date. The Executive Secretary of the College was pleased to have had a part in the organization of these College chapters and he has, upon invitation, attended many of the chapter meetings in this country. More recently, the Executive Secretary attended the meeting of the Union of Latin American Tuberculosis Societies at Havana, Cuba, as an official delegate of the College. The activities of the College chapters have received wide publicity in the College journal and in other medical journals throughout the world. The College chapters enjoy a prominent place in recognized medical circles and we are, of course, very proud of this achievement. All of the officials of the College chapters, past and present, are to be complimented upon this excellent accomplishment.

Boards, Councils, Committees:

As you know, the work of the College is divided among the members of the boards, councils and committees. There is an Executive Council of 7 members; a Board of Regents of 27 members; a Board of Governors of 79 members; an Editorial Board; a Board of Examiners; 6 standing councils, and 12 standing committees. The activities of these boards, councils and committees are correlated and the work is expedited through the Executive Offices of the College. Many of the reports of the boards, councils and committees are being presented to the Board of Regents here today. These reports will be published in the College journal.

Meetings:

Arrangements for all of the College meetings have been under the supervision of the Executive Secretary of the College and it is well to point out at this time that both the national and sectional meetings of the College have been growing in size and attendance each year. It is not necessary to comment on the excellence of the College meetings. The members of the College have become accustomed to expect the finest programs. This is a challenge which is going to become more difficult to fulfill as time goes on.

Publicity:

The Public Relations program of the College has been directed to the recognized medical publications. During the past year 117 items concerning College activities appeared in 75 state medical journals, 22 national medical journals, and 20 foreign medical journals.

Correspondence:

It is difficult to estimate the tremendous amount of mail which passes over the desk of the Executive Secretary of the College. Matters of great importance to the College, and some which might be considered of a trivial nature, but yet in the aggregate, is just as essential to the welfare of the organization as the most important letters, receive the

personal attention of the Executive Secretary. In addition to the large mailings of reprints and other form matters, approximately 20,000 individual pieces of outgoing mail are handled by the Executive Offices of the College during a normal 12 month period. The office staff consists of the Executive Secretary and two assistants who handle this work.

The College Journal:

The Editor-in-Chief of the journal is charged with the responsibility of accepting and editing all scientific manuscripts which are published in DISEASES OF THE CHEST. All of the other work entailed in publishing the journal is the responsibility of the Executive Secretary. "Diseases of the Chest," we are sure, is on a par with the finest medical journals published anywhere in the world.

We are happy to report that during the past fiscal year the advertising revenue of the journal has increased by 35 per cent and the circulation of the journal by 25 per cent.

This report would not be complete without paying tribute to the excellent cooperation between the Editor-in-chief of the journal, his splendid staff, and the Executive Offices of the College.

Conclusion:

In closing, the Executive Secretary wishes to express his appreciation and thanks to his assistants at the Executive Offices, whose loyalty and deep interest in the welfare of the College has helped to make this report possible.

The College serves as a media for cooperation and collaboration among the chest physicians of the world. Momentous opportunities await the members of the American College of Chest Physicians. The College will continue to lead and it has every reason to look ahead to still greater achievements.

Murray Kornfeld
Executive Secretary.

Dr. Mark expressed thanks to Mr. Kornfeld for his untiring efforts and made a motion for acceptance of the report, seconded by Dr. Banyai, and unanimously carried.

Report of the Membership Committee

There are 397 members of the College in the Armed services of our country, of which 304 are in the Army and 93 are in the Navy.

A resolution was adopted by the Board of Regents at the meeting held at St. Louis on November 13, 1944, recommending an amendment to the College By-Laws to change the term Associate Fellowship to Junior Fellow, and that of Associate Member to Affiliate. This amendment in accord with the College By-Laws must be voted upon at an annual meeting by the members of the College. A notice of the contemplated change in the By-Laws has been published in the College journal, *Diseases of the Chest* (Vol. XI, No. 1, Jan.-Feb., 1945).

Other recommendations submitted by the Membership Committee at the last annual meeting of the College held at Chicago, June 10, 1944 and approved by the Board of Regents have been put into effect by the present Membership Committee.

COLLEGE MEMBERSHIP

(Compiled by Countries)

United States of America 1482

United States Possessions:

Alaska	1
Canal Zone	3
Hawaii	14
Philippine Islands	6
Puerto Rico	32
—	—

56

Other Countries:

Australia	9
Argentina	24
Brazil	25
Canada	47
Chile	2
China	1
Colombia	5
Costa Rica	1
Cuba	24
Dominican Republic	1
Ecuador	5
El Salvador	1
Guatemala	2
Haiti	2
India	3
Mexico	27
New Zealand	1
Nicaragua	1
Norway	1
Republic of Panama	5
Paraguay	2
Peru	19
South Africa	10
Uruguay	3
Venezuela	7
—	—

228

TOTAL MEMBERSHIP 1766

Captain Robert E. Duncan, (MC) U.S.N., Washington, D. C., *Chairman*Major General S. U. Marietta, U.S.A., Washington, D. C., *Vice-Chairman*

Leo Eloesser, M.D., San Francisco, Calif.

William E. Ogden, M.D., Ontario, Canada

Herman E. Hilleboe, M.D., Washington, D. C.

Richard H. Overholt, M.D., Brookline, Mass.

Chevalier L. Jackson, M.D., Philadelphia, Pa.

Joseph C. Placak, M.D., Cleveland, Ohio

Ralph C. Matson, M.D., Portland, Oregon

Col. Roy A. Wolford, Washington, D. C.

The report of the Membership Committee was moved for adoption by Dr. Mark, who expressed thanks for Captain Duncan's fine work, seconded by Dr. Peabody, and unanimously carried.

Confirmation of Appointments Governors and Regents

The following appointments which your president has made in accord with the powers granted to him under the By-Laws, are herewith submitted to the Board of Regents of the College for confirmation.

Australia:

Regent—Dr. John H. Blackburn, Queensland.

Governors—Dr. Hilary Roche, Melbourne, *Victoria*.

Dr. J. A. Murphy, Waterfall, *New South Wales*.

Dr. Darcy R. W. Cowan, Adelaide, *South Australia*.

Chile:

Regent—Dr. Hector Orrego Puelma, Santiago.

Governor—Dr. Gilberto V. Zamorano, *Valparaiso*.

Costa Rica:

Governor—Dr. Raul Blanco Cervantes, San Jose.

Dominican Republic:

Governor—Dr. J. M. Moscoso Cordero, Trujillo.

Haiti:

Governor—Dr. Louis Roy, Port-au-Prince.

Republic of Panama:

Regent—Dr. Amadeo Vicente-Mastellari, Panama City,
Central American Countries.

Governor—Dr. Augustin A. Sosa, Panama City.

Puerto Rico:

Regent—Dr. David Garcia, Hato Rey.

Governor—Dr. A. M. Marchand, Santurce.

Jay Arthur Myers, M.D., Minneapolis, Minn.
President.

Dr. Peabody made a motion that these appointments be accepted, seconded by Dr. Strohm, and adopted unanimously by the Board of Regents.

Report of the Board of Examiners

The Board of Examiners has not had an opportunity to meet formally and discuss policies regarding qualifying examinations. Informally, through correspondence, there has been an exchange of ideas and views regarding the subject matter given in previous examinations and suggestions were offered for the improvement of future examinations.

It was decided to hold an examination on June 16th at Chicago. Because of traveling conditions, it was thought best to permit those who were unable to come to Chicago, to take the examination as close to their homes as possible on the same day, or as close as possible to June

16, provided that the Governor or Regent of the corresponding district, or some other official of the College, supervised the examination. It was thought best to limit this examination to a written one, covering the following subjects: Thoracic diseases, medical and surgical aspects; physiology; bacteriology and immunology; pathology; and anatomy of the chest.

In addition to the members of the examining board who contributed the medical and surgical questions, the following were kind enough to submit questions as follows:

Anatomy of the Chest—Dr. Jay Arthur Myers, Minneapolis, Minnesota.

Physiology—Dr. Alrick Hertzman, Professor and Director of the Department of Physiology, St. Louis University.

Bacteriology and Immunology—Professor L. R. Jones, Head and Director of the Department of Bacteriology and Immunology, St. Louis University.

Pathology—Dr. Ruth Silverberg, Pathologist to City Hospital and Jewish Hospital, St. Louis, Missouri.

The examining board is indeed indebted to these people for their willingness to assist in the preparation of the questions. It is needless to state that many problems face the board. For instance, shall we be satisfied with a written examination or shall we include an oral examination? Shall we also consider a clinical, practical examination in the future?

It will be the purpose of the examining board to admit to Fellowship only those applicants who have shown through the medium of the qualifying examinations that they possess a satisfactory medical background plus adequate training and experience in the field of chest diseases.

The committee wishes to solicit suggestions for the improvement of this activity of the College, not only from the Board of Regents and Governors, but also from the membership at large.

The Board of Examiners has completed arrangements for 38 candidates from 17 states to take the following written examination:

WRITTEN EXAMINATION FOR FELLOWSHIP

American College of Chest Physicians

Thoracic Diseases (Medical Aspects)

Part 1

Discuss the differential diagnosis of a pain in the region of the 3rd and 4th inter-costal space on the left side in a man about 50 years of age.

Thoracic Diseases (Medical Aspects)

(Answer 3 of the 5 questions)

Part 2

- (1) Being consulted by a patient suspected of having pulmonary tuberculosis, outline briefly the procedure you would follow to confirm or disprove the diagnosis of pulmonary tuberculosis.
- (2) Being consulted by a patient with active, reinfection pulmonary

tuberculosis, describe briefly the course you would outline for the patient.

- (3) Discuss the significance and treatment of pulmonary hemorrhage occurring in a patient with clinical reinfection pulmonary tuberculosis.
- (4) Discuss briefly the diagnosis, treatment and prognosis of tuberculous enterocolitis complicating reinfection pulmonary tuberculosis.
- (5) Discuss briefly the place of mechanical therapy in the treatment of reinfection pulmonary tuberculosis, pointing out, in a general way, the indications for this method of treatment.

Thoracic Diseases (Surgical Aspects)

(Answer (1) and any two of the remaining four)

- (1) What are the indications and contraindications for total pneumonectomy for carcinoma of the lung?
- (2) In the event of contemplated total pneumonectomy or lobectomy, what do you consider of importance in preoperative preparation? Discuss briefly (a) preoperative pneumothorax, (b) chemotherapy and other rationale.
- (3) Describe briefly the mechanism of the intrathoracic readjustments following pneumonectomy.
- (4) Discuss closure of the primary bronchus in total pneumonectomy and secondary bronchi in lobectomy.
- (5) Mention important features of postoperative treatment, (a) the use of oxygen; (b) chemotherapy; (c) position of patient immediately following operation and (d) bronchoscopic aspiration.

Anatomy of the Chest

(Answer any two of the three questions)

- (1) Describe the nerve supply of the lungs and pleura.
- (2) What are the anatomical relations of the apex of the right and left lungs which account for differences in physical signs over these areas anteriorly?
- (3) Why are aspirated foreign bodies more likely to be found in the right than in the left lung?

Physiology

(Answer any two of the following four questions)

- (1) What would be the effect on a patient with a unilateral pneumothorax of ascent in an airplane to an altitude of 6,000 feet (over Chicago)?
- (2) Describe and explain the production of dyspnea in lobar pneumonia.
- (3) Explain the occurrence of anoxia and of dyspnea in asthma.
- (4) Why doesn't collapse of one lung as in pneumothorax, asphyxiate or produce anoxia?

Pathology

(Answer any two of the following four questions)

- (1) Discuss the cor-pulmonale and give its causes.
- (2) List in their relative frequency the benign and primary malignant tumors occurring in the thoracic cavity. Describe the histological appearance of any one benign and one malignant tumor.

- (3) Discuss the pulmonary complications of lobar pneumonia. Describe gross and histological appearance.
- (4) Describe grossly and microscopically the primary lesion in pulmonary tuberculosis and discuss the possible courses it may take.

Bacteriology and Immunology

(Answer any two of the following four questions)

- (1) Indicate the nature of two laboratory procedures which may be employed in the possible recognition of the etiologic agent of tuberculosis in sputum. Give an advantage and a disadvantage of each procedure.
- (2) As an aid in the problem of diagnosis of tuberculous infection, discuss the possible value of those measures which are related to the state of specific hypersensitiveness in the patient.
- (3) In pneumococcal pneumonia, why may early "typing" of the causative organism be of importance?
- (4) Discuss the probable etiology of the early and later stages of the common cold.

H. I. Spector, M.D., St. Louis, Missouri, *Chairman*

Edward W. Hayes, M.D., Monrovia, Calif.

William F. Rienhoff, M.D., Baltimore, Md.

In the absence of Dr. Spector, Dr. E. W. Hayes read the report of the Board of Examiners. Dr. Banyai moved the acceptance of the report and expressed appreciation of Dr. Spector's fine efforts, seconded by Dr. Hendricks, and carried unanimously.

Report of the Committee to Study the Advisability of Establishing a Board of Diseases of the Chest

Statement of Purpose:

The purpose of this report is to bring the members of the Board of Regents of the American College of Chest Physicians up to date on the activities of the committee appointed by the College President to study the advisability and the steps to be taken for the establishment of a Board of Diseases of the Chest.

Recognized Boards:

We are listing below the fifteen recognized boards and the year of their incorporation, together with the number of physicians certified as of March 1, 1945.

<i>Name of Board</i>	<i>Year Incorporated</i>	<i>Certificates (3-1-45)*</i>
American Board of Ophthalmology	1917	2,437
American Board of Otolaryngology	1924	3,848
American Board of Obstetrics and Gynecology	1930	1,871
American Board of Dermatology and Syphilology	1932	710
American Board of Pediatrics	1933	2,318
American Board of Psychiatry and Neurology	1934	1,899
American Board of Orthopaedic Surgery	1934	896
American Board of Radiology	1934	2,095

<i>Name of Board</i>	<i>Year Incorporated</i>	<i>Certificates (3-1-45)*</i>
American Board of Urology	1935	1,018
American Board of Internal Medicine	1936	3,541
American Board of Pathology	1936	1,047
American Board of Surgery	1937	2,499
American Board of Plastic Surgery	1937	161
American Board of Anesthesiology	1938	249
American Board of Neurological Surgery	1940	163

TOTAL

24,725

*J.A.M.A., May 12, 1945, pp. 128-129.

Sub-Boards:

The following subspecialties have been organized under the American Board of Internal Medicine and the American Board of Surgery.

<i>American Board of Internal Medicine:</i>	<i>Certificates (3-1-45)*</i>
Sub-Board of Allergy	75
Sub-Board of Cardiovascular Disease	325
Sub-Board of Gastroenterology	157
Sub-Board of Tuberculosis	136
	693

American Board of Surgery:

Sub-Board of Proctology	71
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TOTAL

764**

*J.A.M.A., May 12, 1945, pp. 128-129.

**The above 764 who have been certified in the subspecialties are included in the total figures published for the American Board of Internal Medicine and the American Board of Surgery.

Applicants who desire to be certified in the subspecialties are required to pass the oral and written examinations of the main specialty board before they can take the examination in the subspecialty.

Sub-Board of Tuberculosis:

In a communication received from the Assistant Secretary-Treasurer of the American Board of Internal Medicine, dated March 29, 1945, the following are the figures given as of that date for the Sub-Board of Tuberculosis:

Total number of physicians certified in the subspecialty of tuberculosis	136
Total number of physicians certified without examination in the subspecialty of tuberculosis	104
Number admitted by examination	32
Number admitted by examination in 1944	5

Board of Examiners of the College:

As a comparison between the number of chest specialists who have been admitted by examination to the sub-board of tuberculosis and those admitted by examination to Fellowship in the American College of Chest Physicians, we list below the following figures:

Examinations for College Fellowship

	<i>Passed</i>	<i>Failed</i>	<i>Total</i>
June 5, 1942—Oral	24	1	25
Jan. 29, 1943—Written	16	4	20
Nov. 17, 1943—Written	10	0	10
June 9, 1944—Written	27	5	32
June 16, 1945—Written	31	7	38
	—	—	—
TOTAL	108	17	125

Advisory Board for Medical Specialties:

The Advisory Board for Medical Specialties was organized in 1933-34 to coordinate graduate education and certification of medical specialties in the United States and Canada.

The Advisory Board is composed of two representatives from each of the approved examining Boards in the medical specialties and such other national organizations as are interested in education, examination and certification of medical specialists, and duly elected to this body.

In 1940 there was published the first edition of the Directory of Medical Specialists containing the names and biographic data of all men certified by the several specialty Boards, as well as information regarding the organization and functions of these Boards (approximately 14,000 names). In 1942 there was published the second edition of the Directory of Medical Specialists (approximately 18,000 names).

The Advisory Board reports directly to its member groups and functions in close cooperation with the Council on Medical Education and Hospitals of the American Medical Association, and with the Advisory Council on Medical Education.

The Advisory Board has voted that no more subsidiary Boards be formed and that further special groups be provided for, so far as possible, within the Boards of Medicine and Surgery.

Activities of the College Committee to Study the Advisability of Establishing a Board of Diseases of the Chest:

After considerable correspondence dating back to July 17, 1940, and the holding of a number of committee meetings and conferences, the following resolution was adopted at a joint meeting at St. Louis, November 14, 1944, of committees representing the American Association for Thoracic Surgery, the American Broncho-Esophagological Association, and the American College of Chest Physicians. "Resolved, that it be the consensus of opinion of the representatives of the societies assembled at this conference, that the American College of Chest Physicians, the American Trudeau Society, the American Association for Thoracic Surgery, and the American Broncho-Esophagological Association should appoint committees to meet jointly with the Advisory Board for Medical Specialties in order to discuss the question under consideration." ("Diseases of the Chest," January-February, 1945, pp. 95-96).

It is, however, the consensus of opinion of the members of the College

committee that a formal agreement be reached among the officials of the above-mentioned societies before a constructive program can be discussed with the Advisory Board of Medical Specialties. At the present time there are many conflicting views regarding this matter which need to be ironed out.

Policy of the American Trudeau Society Regarding Certification:

We quote the following report from the Committee on Policy of the American Trudeau Society, as published in the American Review of Tuberculosis, February, 1945:

"The American Trudeau Society indorses the principle that physicians specializing in tuberculosis, or other restricted branches, should be fundamentally well qualified in internal medicine. This is the principle also underlying the policies of the American Board of Internal Medicine in certifying specialists. The American Trudeau Society cooperates with the American Board of Internal Medicine to this end. The Society encourages and urges its members who are interested in becoming certified, to apply to the American Board of Internal Medicine. The proper procedure is as follows:

"The applicant must first be certified in internal medicine by the American Board after he has satisfied the requirements and has passed written and oral examinations. After such certification he may apply for additional certification in the subspecialty of tuberculosis. On passing an oral examination in the subject of the subspecialty, he may then receive this additional certification by vote of the American Board of Internal Medicine. Request for formal application blanks and for other information should be addressed to Dr. William A. Werrell, Assistant Secretary-Treasurer, American Board of Internal Medicine, 1301 University Avenue, Madison 5, Wisconsin.

Dr. John Alexander

Dr. Chesley Bush, Chairman
Dr. J. Burns Amberson, Jr.

Dr. James J. Waring

*College Committee Recommends Establishing a
Board of Diseases of the Chest:*

It is the unanimous opinion of the members appointed by the President of the College to study the advisability of organizing a Board of Diseases of the Chest, that such a Board should be organized and that it apply for admission to the Advisory Board for Medical Specialties. It is further recommended that a Board on Diseases of the Chest should be accepted under the same terms and conditions as the other fifteen existing and recognized medical specialty boards. It is the consensus of opinion of the members of the College committee that the Sub-Board of Tuberculosis is inadequate and that it does not fulfill the needs for certification in the specialty of diseases of the chest. This is borne out by the small number of physicians who have been admitted to the Sub-Board of Tuberculosis by examination. It is also the consensus of opinion of the members of this committee that the term "tuberculosis specialist" is inadequate and that this term does not take into consideration all of the other diseases which are found in the chest cavity. The committee, therefore, recommends that the term "chest specialist" should be used rather than the term "tuberculosis specialist".

The following summary of an article entitled "The Chest Specialist: His Training and Services," by Milton S. Lloyd, M.D., F.C.C.P., New York, N. Y.,* presented before the annual conference of College Chapter Of-

*To be published in *Diseases of the Chest*.

ficials meeting at Chicago, Illinois, June 12, 1944, is added to this report because it adequately expresses the views of a large number of the chest specialists in this country.

1. Since the turn of the century, the chest specialist's field has been developed and perfected to a high degree.

2. This field now comprehends a number of methods and procedures requiring specialized training such as x-ray, pneumothorax, bronchoscopy and surgery.

3. All these methods are closely interrelated and knowledge in any one of them enhances ability in the others.

4. At present, students in this specialty are prevented from reaching a maximum perfection in their work by regulations and restrictions carried over from the past. These regulations also force students in other specialties, as well as their teachers, to devote unnecessary time to fields of training which will never be used in practice.

5. It is recommended that the chest specialist be permitted the same freedom of action in the exploitation of his own field as is enjoyed by other specialties.

6. Such a course would permit the chest specialist to stand upon his own resources and to carry the benefits of his training to the general populace through existing hospitals by creating new outlets for his services.

Post War Certification:

In the final report on 21,029 questionnaires returned to the American Medical Association on the postgraduate wishes of medical officers, it is stated that 71 per cent of these officers desire certification (J.A.M.A., March 31, 1945, pp. 759-770). If this percentage holds true, there are 40,000 or more men now in the armed services who desire certification. A large number of these men will be obliged to take the Board of Internal Medicine before they can be certified in their particular specialties. Our committee feels that it has a duty to perform in the interests of the College members serving with the armed forces, as well as for those physicians in the armed forces who will desire to become chest specialists. We do not think that it is fair to expect these qualified chest specialists to take an examination in the Board of Internal Medicine, nor is it fair to expect them to take an additional examination in the Sub-Board of Tuberculosis. These men should be examined as chest specialists, by a Board of chest specialists, and they should be certified as chest specialists.

Resolutions Adopted by College Chapters:

*New York State Chapter**

1. Whereas the field of medical endeavor comprehended by the term "chest specialist" is a well defined specialty and,

2. Whereas the exploitation of this field requires particular training in and exercise of a number of specialized methods and practices and,

3. Whereas the chest specialist is greatly handicapped by not having the unrestricted freedom in his field which is enjoyed by other specialties and,

4. Whereas equal difficulty is now being experienced from the same cause in the training of the rising generation of chest specialists and,

*Adopted at the Chapter Meeting, Biltmore Hotel, New York City, February 2, 1945.

5. Whereas, due to the lack of properly trained specialists, general hospitals are, for the most part, left with inadequate or no service at all in the field of chest diseases and,

6. Whereas part of these difficulties is perpetuated by the fact that the specialty of chest diseases has not been officially recognized as such,

Therefore, be it resolved that this body, in official session assembled, place itself on record as in favor of the following:

1. Recognition of "chest diseases" as a specialty by the American Board for Medical Specialties.

2. Freedom of the chest specialist to practice and explore all methods of diagnosis and treatment within his province which will contribute to the patient's welfare.

3. The right of all internes, residents and practitioners in special chest hospitals or chest services to receive instruction in all methods of diagnosis and treatment of chest diseases for which they are qualified by ability and previous training.

4. The appraisal of all properly interested bodies of the content of this resolution, urging that they use their influence to secure its adoption with the least possible delay.

*Indiana Chapter**

The Indiana Chapter of the American College of Chest Physicians goes on record as supporting the establishment of a Board of Diseases of the Chest to replace the sub-specialty of Tuberculosis of the Board of Internal Medicine.

*Adopted at the Chapter Meeting, Columbia Club, Indianapolis, March 18, 1945.

Illinois Chapter

The Illinois Chapter of the American College of Chest Physicians at a special meeting held at the Bismarck Hotel, Chicago, Illinois, April 5, 1945, recommends to the Board of Regents of the College that steps be taken to establish at an early date the American Board of Diseases of the Chest.

Such a Board should, if possible, be organized in conformity with the rules established by the Advisory Board for Medical Specialties, and Council on Medical Education of the American Medical Association.

It is the consensus of opinion of the members of the Illinois Chapter of the College that the present Sub-Board of Tuberculosis is inadequate and that it does not give proper recognition to the physicians who are qualified chest specialists.

The Secretary of the Illinois Chapter of the College is hereby authorized to send a copy of this resolution to the Executive Secretary of the American College of Chest Physicians and it is to be presented to the Board of Regents of the College at their next annual meeting.

California Chapter

Board of Regents
American College of Chest Physicians
Gentlemen:

May 7, 1945

We understand that the question of establishing the American Board of Diseases of the Chest will come before the June meeting of the Board

of Regents of this College. We the undersigned of the California Chapter feel that such a Board is of importance to the chest specialists in this country and therefore respectfully urge your immediate consideration of this matter.

Sincerely yours,

Stephen A. Parowski, M.D., *President*

Harry C. Warren, M.D., *Regent*

John C. Sharp, M.D., *Governor*

Seymour M. Farber, M.D., *Secy.-Treas.*

RESOLUTION

This committee recommends to the Board of Regents of the American College of Chest Physicians that they adopt the following resolution:

BE IT RESOLVED: That the Board of Regents of the American College of Chest Physicians, in annual session at Chicago, Illinois, June 17, 1945, go on record as supporting the establishing of a Board of Diseases of the Chest and that the President of the College be authorized to appoint a committee to take the initiative to assist in formulating such a Board.

The name of the Board shall be the "American Board of Diseases of the Chest" and the Board when duly organized shall make proper application for admittance to the Advisory Board for Medical Specialties. This Board shall be a separate organization and shall be incorporated in conformity with the rules and regulations set forth by the Advisory Board for Medical Specialties.

BE IT FURTHER RESOLVED: That the American Trudeau Society, the American Association of Thoracic Surgery and the American Broncho-Esophagological Association be invited to join with this committee in the formation of the Board and have representation on this Board.

AND BE IT FURTHER RESOLVED: That in the event the other three societies, or any of these societies, fail to participate in the sponsoring of this Board, the Committee of the American College of Chest Physicians take the necessary steps to sponsor this Board.

Dr. J. Winthrop Peabody, Washington, D. C., *Chairman*

Dr. Charles M. Hendricks, El Paso, Texas

Dr. Edgar Mayer, New York, N. Y.

Dr. Chevallier L. Jackson, Philadelphia, Pa.

Dr. Joseph C. Placak, Cleveland, Ohio

This resolution was moved for adoption by Dr. Overholt; seconded by Dr. Hendricks, and passed unanimously by the Board of Regents.

Meeting: Council on Undergraduate Medical Education

A meeting of the Editorial Board of the proposed textbook on tuberculosis which is being sponsored by the Council on Undergraduate Medical Education of the College was held at the Palmer House, Chicago, Illinois, on June 17, 1945. The meeting was attended by the following members of the Council and invited guests:

Dr. E. W. Hayes, Monrovia, California, *Chairman*

Dr. Andrew L. Banyai, Milwaukee, Wis.

Dr. Benjamin L. Brock, Louisville, Ky.

Dr. Seymour Cohen, Oak Terrace, Minn.

Dr. Charles M. Hendricks, El Paso, Texas

Dr. Paul H. Holinger, Chicago, Illinois

Dr. William A. Hudson, Detroit, Michigan

Dr. C. Howard Marcy, Pittsburgh, Pa.

Dr. Jay Arthur Myers, Minneapolis, Minn.

Dr. William C. Ogden, Toronto, Ontario

Dr. Richard H. Overholt, Brookline, Mass.

Dr. J. Winthrop Peabody, Washington, D. C.

Dr. Joseph C. Placak, Cleveland, Ohio

Dr. Nelson W. Strohm, Buffalo, N. Y.

Dr. Paul A. Turner, Louisville, Kentucky

Dr. Hayes, the Chairman of the Council, outlined the purposes of the book and reported on the progress made to date. An interesting discussion took place in which all of those present participated. Following the discussion, a deadline for the receipt of the material to be published in the book was set as October 1, 1945.

It was agreed that this book be prepared as a textbook for medical students and a guide for teachers of tuberculosis. It was proposed that this book be brief, that it contain in as few well-chosen words as possible, the fundamentals which have to do with the cause, prevention, the diagnosis and the treatment of tuberculosis, and that this information be set forth in short, concise chapters. It is not intended to supplant the voluminous textbooks already published on tuberculosis and students will be encouraged and urged to develop their knowledge on tuberculosis by reading more extensive literature on the subject. It is the plan of the Council to revise the text of this book from time to time in order to keep it up to date.

Dr. Hendricks made a motion for the adoption of the plans for the book as presented, seconded by Dr. Mark and carried unanimously.

PROPOSED TEXTBOOK SPONSORED BY THE COUNCIL ON UNDERGRADUATE MEDICAL EDUCATION

American College of Chest Physicians

TITLE: TUBERCULOSIS: A TEXT IN BRIEF FOR THE STUDENT
AND TEACHER.

Authors and Subjects:

Banyai, Andrew L., M.D., Wauwatosa, Wisconsin.

"Differential Diagnosis of Reinfection Tuberculosis."

Brock, Benjamin L., M.D., Waverly Hills, Kentucky.

"The Role of the Bronchial Tree in the Pathogenesis of Pulmonary Tuberculosis."

Cohen, Sumner S., M.D., Oak Terrace, Minnesota.

"Laryngeal Tuberculosis."

Hayes, Edward W., M.D., Monrovia, California.

"The Treatment of Reinfection Pulmonary Tuberculosis and Tuberculous Enterocolitis."

Hayes, John N., M.D., Saranac Lake, New York.

"Pulmonary Hemorrhage and Pleural Effusion as They Relate to Pulmonary Tuberculosis, Together with the Complications of Reinfection Pulmonary Tuberculosis, Except, Tracheal and Endo-Bronchial Tuberculosis, Tuberculous Enterocolitis, Laryngeal Tuberculosis and Genito-Urinary Tuberculosis. Prognosis of Reinfection Pulmonary Tuberculosis."

3. Classification of pulmonary tuberculosis—Illustrated

G. Diagnosis of reinfection pulmonary tuberculosis

H. Differential diagnosis of reinfection pulmonary tuberculosis from:

1. Benign tumors of the lung
2. Carcinoma of the lung
3. Silicosis
4. Asbestosis
5. Siderosis
6. Bagassosis (Bagasse disease)
7. Cystic disease of the lung
8. Bronchiectasis
9. Pulmonary abscess
10. Mediastinal abscess
11. Loeffler's syndrome
12. Pulmonary embolism
13. Coccidioidomycosis
14. Bronchopulmonary monilliasis
15. Pulmonary streptothricosis
16. Pulmonary blastomycosis
17. Pulmonary aspergillosis
18. Pulmonary sporotrichosis
19. Pulmonary actinomycosis
20. Torulosis
21. Pulmonary histoplasmosis
22. Atelectasis
23. Friedlander's pneumonia
24. Fibroid pneumonia
25. Lipoid pneumonia
26. Pneumococcal pneumonia
27. Influenzal pneumonia
28. Primary atypical pneumonia
29. Ornithosis
30. Bronchopneumonia
31. Pulmonary sarcoidosis
32. Pulmonary syphilis
33. Foreign bodies in the lung
34. Pleural effusion
35. Hodgkin's disease
36. Pulmonary anthrax
37. Pulmonary glanders
38. Paragonimiasis (Endemic Hemoptysis)
39. Hydatid cyst of the lung
40. Non-tuberculous spontaneous pneumothorax
41. Chronic non-tuberculous bronchitis
42. Bronchial asthma
43. Emphysema
44. Hyperthyroidism
45. Undulant fever
46. Focal infections
47. Neurasthenia
48. Heart and vascular diseases
49. Kidney disease
50. Diabetes mellitus

51. Syphilis
52. Anemias
53. The leukemias
54. Gall bladder disease
55. Influenza
56. Trichinosis
57. Malaria
58. Typhoid fever
59. Amebiasis
- I. Treatment of reinfection pulmonary tuberculosis
 1. Psychosomatic aspects
 2. General treatment of reinfection pulmonary tuberculosis
 - a. Prophylaxis
 - b. Determination of activity or inactivity of lesion
 - c. Therapeutic program for patient
 - 1'. Rest
 - a'. Supplements to rest
 - 2'. Climate
 - 3'. Diet
 - 4'. Drugs
 - 5'. Light therapy
 3. Operative therapy
 - a. Simpler forms of operative therapy
 - b. Major forms of operative therapy
- J. Complications of reinfection pulmonary tuberculosis in general including pleural effusion and pulmonary hemorrhage
 1. Tuberculous enterocolitis
 2. Tracheal and endo-bronchial tuberculosis
 3. Laryngeal tuberculosis
 4. Genito-urinary tuberculosis}(These to be discussed in separate chapters by other authors.)
- K. Reinfection pulmonary tuberculosis and
 1. Pregnancy
 2. Silicosis
 3. Diabetes
- L. Public Health aspects of pulmonary tuberculosis
- M. Prognosis of reinfection pulmonary tuberculosis

Report of the Council on Postgraduate Medical Education

The main objective undertaken by the Council on Postgraduate Medical Education of the College during the past year was the establishing of a Speaker's Bureau. Because of the cancellation of most of the national and state medical meetings, it was the opinion of the members of this Council that further postgraduate medical education would have to be carried out at a local level. It was, therefore, deemed advisable that plans be formulated so that competent speakers on timely subjects con-

cerning the latest developments in diseases of the chest could be made available for the meetings of the county medical societies.

With this arrangement in mind, the Council on Postgraduate Medical Education mailed questionnaires to the members of the College. Replies were received from 44 members in 22 states. The subjects upon which the speakers are prepared to talk have been listed and published in the College journal, *Diseases of the Chest* (March-April, 1945, Vol. XI, No. 2, pp. 163-165). Reprints have been made of this information and the executive office is now in the process of mailing these reprints to the secretaries of some 3,000 county medical societies in this country. Our Council is requesting the members of the Program and Public Relation Committees of the College chapters to contact the secretaries of the local medical societies and complete arrangements for speakers on these various phases of chest diseases in connection with the scientific meetings of the societies.

The Council on Postgraduate Medical Education of the College makes the following recommendations:

- (1) That the Speakers Bureau be made a permanent part of the College program and that the information be made available to the state medical societies and to national medical organizations when such societies again consider arranging scientific programs.
- (2) That the information be made available to the Scientific Program Committee of the College and that subject matter of interest to the members of the College be incorporated in the annual scientific programs.
- (3) That this information be given to the Editor of the College journal, *Diseases of the Chest*, in order that articles of interest to the readers of the journal may be obtained from among the subject matters compiled by the Speakers Bureau for publication in the journal.

The Council urges that chest x-ray conferences be made a part of all scientific programs concerned with diseases of the chest. It further recommends that the roentgenological societies be encouraged to cooperate with the chest specialists in presenting chest x-ray conferences. It is the opinion of this Council that other allied groups interested in diseases of the chest be invited to participate in these x-ray conferences.

The Council on Postgraduate Medical Education of the College has studied a recommendation submitted by Dr. George Foster Herben, Governor of the College for New York State, and presented at a meeting of the Board of Regents held at St. Louis on November 13, 1944, by Dr. Nelson W. Strohm, Regent of the College for New York State, concerning postgraduate medical education for physicians who are serving with the armed forces of our country. The Council proposes the following resolution for adoption by the Board of Regents:

IT IS PROPOSED: That the Council on Postgraduate Medical Education of the American College of Chest Physicians take immediate steps to organize a program on postgraduate medical education covering the various phases of chest diseases and that this course be made available without cost to all physicians in the armed services.

IT IS FURTHER PROPOSED: That special attention be given to preparing refresher courses for members of the College after they are released from the armed services of our country.

Wherever possible, these courses should be correlated with the refresher courses sponsored by the Surgeons General of the U. S. Army and the U. S. Navy.

J. Winthrop Peabody, M.D., Washington D. C., *Chairman*

Paul D. Crimm, M.D., Evansville, Ind.

Carl R. Howson, M.D., Los Angeles, Calif.

James S. Edlin, M.D., New York, N. Y.

I. L. Robbins, M.D., New Orleans, La.

Geo. B. Gilbert, M.D., Colorado Springs, Colo.

Moses J. Stone, M.D., Boston, Mass.

Alvis E. Greer, M.D., Houston, Texas

Willard Van Hazel, M.D., Chicago, Ill.

Upon motion by Dr. Mark, seconded by Dr. Strohm, this report and resolution were accepted by the Board of Regents.

Report of the Council on Military Affairs and Public Health

The Council on Military Affairs and Public Health has divided its program into two parts: A) Activities which are primarily concerned with military affairs, and B) Activities which are confined to the public health.

A) Military Affairs:

Concerning the program on Military Affairs, the Council has confined its activities to the arrangement and presentation of reports from the officials of the various branches of the Government at the annual meetings of the College, commencing with the annual meeting at Cleveland in 1941. Similar meetings have been held at Atlantic City, 1942, and Chicago, 1944. The College did not meet in 1943. Through these get-togethers the membership of the College was informed by competent authorities representing the various services of the Government, concerning the latest advancements in meeting the problems of tuberculosis and other chest conditions by the Government Medical Service of our country. All of the papers presented at these meetings were published in the College journal, *Diseases of the Chest*. The symposium on "Tuberculosis in World War II," which was presented at the last annual meeting of the College, was published in the May-June, 1945 issue of the College journal (Vol. XI, No. 3).

The Council will continue to keep abreast of the latest developments in military affairs, particularly as it effects returning veterans.

B) Public Health

In 1943 this Council published an article in the College journal entitled "Tuberculosis in Our Industrial Army: An Appeal to Management and Labor" (May-June, 1943, Vol. IX, No. 3). The purpose of the article was to encourage mass chest x-ray examinations in industry. Requests for more than 20,000 reprints of this article were received from physicians, tuberculosis societies, public health officials and from others interested in the program. These requests came from nearly every state in the Union and after a period of two years, requests are still being received by this Council for reprints of the article. We are pleased to report that we have complied with all of the requests and we will continue to send out the reprints, as long as the present supply is available.

In the March-April, 1945 issue of *Diseases of the Chest*, the Council released a follow-up article entitled "Man Power and Tuberculosis," and requests for copies of this reprint are already being received in considerable number.

Charles M. Hendricks, M.D., El Paso, Texas, <i>Chairman</i>	
Richard Davison, M.D., Chicago, Illinois	Maj. Gen. S. U. Marietta, U.S.A.,
Capt. Robert E. Duncan, U.S.N.,	Washington, D. C.
Washington, D. C.	Joseph W. Post, M.D., Philadelphia, Pa.
Herman E. Hilleboe, M.D., Washington, D. C.	Samuel E. Thompson, M.D., Kerrville, Texas
Col. Roy A. Wolford, Washington, D. C.	Walter E. Vest, M.D., Huntington, W. Va.

Upon motion by Dr. Strohm, seconded by Dr. Turner, this report was accepted by the Board of Regents.

Report of the Council on Sanatorium Standards and Administration

A meeting of the Council on Sanatorium Standards and Administration was held at St. Louis, Missouri, on November 14, 1944. The following members of the Council were present:

Dr. Russell S. Anderson, Erie, Pennsylvania
 Dr. Merle D. Bonner, Jamestown, N. C.
 Dr. Myron Miller, Columbus, Ohio
 Dr. Benjamin L. Brock, Waverly Hills, Ky.

The Council was honored by the presence of the following Regents of the College:

Dr. Andrew L. Banyai, Wauwatosa, Wisconsin
 Dr. Edward W. Hayes, Monrovia, California
 Dr. Charles M. Hendricks, El Paso, Texas
 Dr. J. Winthrop Peabody, Washington, D. C.

We were also delighted to have Mr. Murray Kornfeld, Executive Secretary, with us at this meeting. Everyone present was invited to enter freely in the discussion.

It was agreed that a Conference of Medical Directors and Medical Superintendents of Tuberculosis Sanatoria be sponsored by the Council on Sanatorium Standards and Administration.

Dr. J. Winthrop Peabody, Washington, D. C., was invited by the Council to address the first Conference. Dr. Peabody graciously accepted the invitation and the meeting was adjourned.

Benjamin L. Brock, M.D., Louisville, Kentucky, <i>Chairman</i>	
Russell S. Anderson, M.D., Erie, Pa.	J. B. McKnight, M.D., Sanatorium, Texas
I. D. Borrowitz, M.D., Otisville, N. Y.	Myron Miller, M.D., Columbus, Ohio
Merle D. Bonner, M.D., Jamestown, N. C.	Joseph R. Morrow, M.D., Ridgewood, N. J.
Kenneth G. Bulley, M.D., Aurora, Ill.	Harry C. Warren, M.D., San Francisco, Calif.

Upon motion by Dr. Mark, seconded by Dr. Ogden, this report was accepted by the Board of Regents.

Report of the National Council of Tuberculosis Committees

Since the publication of our last report, we are pleased to inform the Board of Regents of the College that the President of the Medical Society of the State of West Virginia has been authorized by the House of Delegates to appoint a Tuberculosis Committee.

We have, on the other hand, received advice from the Regent of the College for the State of New York that the Subcommittee on Diseases of the Chest, which was established several years ago by the New York State Medical Society, has been abolished. This Subcommittee on Diseases of the Chest was approved by the New York State Medical Society after considerable effort by Dr. Nelson W. Strohm, then Governor of the College for the state and now a member of this Board.

In accordance with our latest information, there are tuberculosis committees in 42 states and the District of Columbia.

The organization of tuberculosis committees within state medical societies was undertaken by the American College of Chest Physicians in 1939, and the National Council of Tuberculosis Committees which has functioned during the past five years has stimulated their organization in those states which had not up to that date appointed such committees. We hope that in the near future, our council will be able to report that a tuberculosis committee has been made a part of every state medical society in this country. The next objective will be to have similar committees established in the county medical societies, and particularly so, in the larger counties and cities. Through this plan of organization, many more physicians will be brought into the tuberculosis program sponsored by the American College of Chest Physicians.

James H. Stygall, M.D., Indianapolis, Indiana, *Chairman*

Arnold S. Anderson, M.D., St. Petersburg, Fla.

James F. Brewer, M.D., New Bedford, Mass.

D. W. Heusinkveld, M.D., Cincinnati, Ohio

Robert G. McCorkle, M.D., San Antonio, Texas

John S. Packard, M.D., Allenwood, Pa.

S. A. Parowski, M.D., San Diego, Calif.

John K. Shumate, M.D., Madison, Wis.

Nelson W. Strohm, M.D., Buffalo, N. Y.

Upon motion by Dr. Banyai, seconded by Dr. Marcy, this report was accepted by the Board of Regents.

Report of the Chairman of the Board of Governors

I am happy to bring to the members of the Board of Regents of the College assembled here in annual session, the greetings of the Governors of the College from the 48 states, the District of Columbia, and from our Governors in the various other countries.

Because the annual meeting for this year could not be held, it will be necessary that the activities of the Governors of the College be conducted through the mails. A mimeographed release has been prepared at the Executive Offices of the College and approved by the President of the College for distribution by the Governors to members and

prospective members in their respective states. Each of the Governors in this country has been mailed a copy of the release and additional copies may be obtained by writing to the Executive Offices of the College at Chicago.

I would like to report for the Michigan Chapter that we have had a very active year and should the state medical society meet this year, the Michigan Chapter of the College will meet with them.

I shall be happy to report to the Governors of the College on the excellence of the meeting of the Board of Regents and the wonderful progress which the College is making.

William A. Hudson, M.D.,
Detroit, Michigan, *Chairman*

Moved for adoption by Dr. Banyai, seconded by Dr. Strohm.

Report of the Conference of College Chapter Officials

The Conference of College Chapter Officials was organized in 1943 for the purpose of coordinating the activities of the College chapters and to present a uniform program which could be adopted by all of the College chapters.

The first Conference was held at Cincinnati in November, 1943 and Dr. Minas Joannides, of the Illinois Chapter, was elected as the first Chairman of the Conference. Dr. Merle D. Bonner, North Carolina, representing the Southern Chapter, was elected the Secretary of the Conference.

The second Conference of College Chapter Officials was held at Chicago in June, 1944 and this session was attended by 56 College chapter officials and guests. The Conference was addressed by Dr. Milton Sills Lloyd, New York City, who spoke on "The Chest Specialist: His Training and Services."

A plan to establish committees within the structure of the College chapters to cooperate with the national councils and committees of the College has made good progress and those chapters which have not as yet set up these committees are being urged to do so at the earliest possible date. The committees in some of the chapters are active and it is hoped that all of the committees will soon begin functioning.

The Secretary-Treasurer of each College chapter submits a financial report annually to the executive offices of the College. The Conference will appoint a committee to study these financial reports and they will make recommendations for the use of chapter funds.

Attached to this report you will find a list of the College chapters together with the dates of their organization.

Alvis E. Greer, M.D., Houston, Texas, *Chairman*
Arthur Q. Penta, M.D., Schenectady, New York, *Secretary*

Upon motion by Dr. Mark, seconded by Dr. Turner, this report was accepted by the Board of Regents.

<i>Chapter</i>	<i>Date of Organization</i>
1. Illinois	May 21, 1940
2. New York State	June 10, 1940
3. New Jersey	June 10, 1940
4. Cuba	December 24, 1940
5. Missouri	April 29, 1941
6. Texas	May 13, 1941
7. Pennsylvania	June 2, 1941
8. Ohio	June 2, 1941
9. Indiana	September 24, 1941
10. Southwestern States	November 19, 1941
11. California	December 12, 1941
12. Michigan	January 20, 1942
13. New England States	May 18, 1942
14. Brazil	November 13, 1942
15. Puerto Rico	January 31, 1943
16. Mexico	September 9, 1943
17. Southern States	November 18, 1943
18. North Midwest States	April 15, 1944
19. Argentina	April 29, 1944
20. Georgia	May 11, 1944
21. Peru	August 13, 1944
22. Wisconsin	September 17, 1944
23. Rocky Mountain States	Sept. 27, 1944
24. Pacific Northwest States	Jan. 22, 1945

Greetings from Canada

Mr. Chairman and members of the Board of Regents of the College, I am very glad to be here. In talking with Mr. Murray Kornfeld, Executive Secretary of the College, I venture to say that I was pleased with the increased membership in Canada. We are still looking forward to an enlargement of our Canadian membership. Because of the war and restricted travel, only five or six Canadians have had the opportunity to attend the annual meetings of the College, but I am certain that with better travel conditions, many more of our Canadian members will attend the annual sessions of the College. I also venture to say that I am quite proud of the fine caliber of our members and when you meet them you will be proud of them too.

William C. Ogden, M.D.,
Toronto, Canada, *Regent*.

Report of the Committee on Public Relations

The Committee on Public Relations of the American College of Chest Physicians has confined its program to obtaining mention of College activities in recognized state, national and foreign medical journals. During the past year, ending June 1, 1945, articles concerning the activities of the American College of Chest Physicians have appeared in the following journals:

State Medical Journals	75 notices
Journal of the American Medical Association	8 notices
Other national medical journals	14 notices
Foreign medical journals	20 notices
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TOTAL	117 notices

Note: Mention of the American College of Chest Physicians was also made in an article by Dr. Evarts A. Graham, published in the Saturday Evening Post, January 27, 1945.

Edward F. Eglee, M.D., New York, New York, *Chairman*

Champ H. Holmes, M.D., Atlanta, Ga. John Roberts Phillips, M.D., Houston, Texas

Robinson Bosworth, M.D., E. St. Louis, Ill. William C. Voorsanger, M.D., San Francisco, Calif.

Upon motion by Dr. Peabody and seconded by Dr. Strohm, this report was accepted by the Board of Regents.

Report of the Council on Pan American Affairs

Two of the three delegates who were authorized by the Board of Regents to represent the American College of Chest Physicians at the meeting of the "Sixth Pan American Congress on Tuberculosis" (ULAST), at Havana, Cuba, in January, 1945, attended the meeting. Dr. Jay Arthur Myers, the third delegate, was unable to complete traveling arrangements. In addition to your chairman and Mr. Murray Kornfeld, Executive Secretary of the College, the meeting was attended by Dr. Leo Eloesser, Vice-Chairman of the Council on Pan American Affairs, San Francisco, Dr. J. Winthrop Peabody, Regent of the College, and Dr. Herman E. Hilleboe, Governor of the College for the U. S. Public Health Service, Washington, D. C. A complete report of the meeting, together with the activities of the Council on Pan American Affairs of the College has been published in the College journal, *Diseases of the Chest*, (March-April, 1945, Vol. XI, No. 2).

Chevalier L. Jackson, M.D.,
Philadelphia, Pa., *Chairman*

Upon motion by Dr. Mark, seconded by Dr. Hayes, this report was accepted by the Board of Regents.

Report of the Committee on the Management and Treatment of Diseases of the Chest

When the Committee on the Management and Treatment of Chest Diseases first began to function in the summer of 1944, a certain amount of correspondence took place between the members of this committee and the chairmen of the various sub-committees with the idea that a number of intangible factors, points requiring clarification would be thrown open for discussion and that shortly after the first of the year there would be a chance at a national or regional meeting for all of

us to get together and work out a functioning program around the table. Circumstances have made this impossible, and we feel that it has been a serious handicap to the proper functioning of our group.

We had the choice of two modes of attack in the beginning. We could have functioned as the customary fact-finding committee collecting a large mass of statistics which could be added to the large mass of statistics already in existence and which we do not believe would add a great deal to the many perplexing problems in the management of chest diseases. We have been struck by the fact that there is no uniformity of terminology or of criteria among the group of men handling diseases of the chest. In tuberculosis, for instance, a search through the literature revealed an enormous number of suggested classifications from the early days up to the recent issue of our journal, and each of these authors felt that re-classification was necessary since the subject was in a state of considerable confusion. The accepted classification of the National Tuberculosis Association—minimal, moderately advanced, and far advanced—has done little to clarify this situation. Only recently has a paper appeared in the *American Review of Tuberculosis* by Reisner and Downes on a follow-up of the so-called minimal tuberculosis.

He found that he could break this group up into four sections in whom the prognosis as to progression varied from 59 to 3 per cent. Furthermore, the wide variation in course and in treatment both with and without collapse therapy in the so-called moderately advanced tuberculosis has been noted for some time. Dr. Rabukhin, writing in *Problems of Tuberculosis*, after collecting statistics all over the world as to the result of pneumothorax and finding the percentage of favorable results varied from 7 to 76 per cent, reports that he was unable to do any comparative study since the criteria of diagnosis, therapy, and prognosis varied to such an extent that it was impossible to find a common ground.

The advent of chemotherapy has further complicated the picture. If we follow the figures of Reisner, it is quite possible to have a difference of more than 50 per cent between two groups of minimal tuberculosis treated with a drug that has no effect on the disease tuberculosis, if the selection of cases happened to fall into two separate classes.

Consequently, we felt that if we were to develop a constructive program for a committee whose work would have such a wide scope, it would be necessary to avoid the obvious difficulties and confusions which have occurred in the past. Our first step would be that of classification—first of tuberculosis, and second of other chest diseases, to establish definite criteria of management. Such a classification would have to clarify to the point of general usefulness the following subjects: 1) diagnosis; 2) prognosis as to life if not as to the course of the disease; 3) following the above two, the indications or necessity for any treatment or type of therapy. Following that, if this work should be successful, the next step would be to determine definite and acceptable criteria as to the result of therapy and the determination of what might be considered a successful or unsuccessful treatment. This is obviously a long term project, a project in which this committee will of necessity merely correlate, regulate, and interpret the opinions and experience of the membership of the College and produce, by this refining process, a formula that would be acceptable since it will have come out of the membership rather than have been imposed upon them.

We do not believe that this work should be hurried, nor do we believe that any group can sit around a table and arrive at a satisfactory solution to a problem that has confused the entire profession for a longer time than our pride will let us admit.

We have reached this point in our decision. As regards tuberculosis, at least, we must consider not only the extent of the lesion, not only its duration, but also the type of pathology with which we are dealing. An exhaustive study of classifications has led us to recommend that our starting point should be that suggested by Ornstein and Ulmar in 1931. This makes a major distinction between lesions marked by exudation and the isolated, nodular lesions whose primary characteristic is a fibrous capsule.

We know from our own experience as well as from the literature that the future of a soft exudation is considerably different and much more indefinite than that of a nodular lesion. We believe that this fact should be taken into consideration definitely and absolutely in determining criteria of any sort. We know from our own experience and from the reported experience of others that exudative lesions may resolve or may break down spontaneously and without regard to treatment. We feel that this fact is sufficiently important to be noted and that some method of determination of the course of the disease must be included in our critical set-up. Even in this small part of the problem that we have set up for ourselves we have already come to seek advice and aid from the general membership. Does this type of division of lesions meet with the general approval, or have we failed to include some other equally important aspect in our discussion? The steps that lie ahead of us are these, and therein lies the work of the sub-committees:

1) The application of diagnostic and prognostic criteria to surgical procedures, non-surgical-collapse, and chemotherapy; 2) the study of comparative groups of treated and untreated cases and cases treated by different means; 3) the establishment of criteria by which various therapeutic procedures should be judged; 4) and in addition to that, we will have the study and discussion of the place of rest in the treatment of tuberculosis—how it may be used and how it may be abused; 5) and the study of re-building and rehabilitation—when it should be begun, and what type of program is most desirable.

This is a program which expands and grows and which in the course of its development should yield really valuable information. We are not yet at a point where fact-finding or collected statistics will be of any value. That will come at whatever point it is decided that such statistics can be properly interpreted.

We trust that such a plan, as is above outlined, will meet with the approval and merit the support of the Board of Regents and of the entire fellowship of the College. We trust that we shall be able to carry this project from the period of planning to the period of work and development and finally to completion. And we trust that our completed product will be of real value in the management and treatment of diseases of the chest.

Edwin Rayner Levine, M.D., Chicago, Illinois, *Chairman*

Colonel John B. Grow, Denver, Colorado

Hillis L. Seay, M.D., Huntersville, N. C.

Upon motion by Dr. Ogden, seconded by Dr. Peabody, this report and the report of the Sub-committee on Chemotherapy and Allied Measures was accepted by the Board of Regents.

Report of the Sub-Committee on Chemotherapy and Allied Measures

Your committee on chemotherapy regrets exceedingly that, due to war time restrictions, it was unable to hold a meeting. In lieu of a personal get-together an attempt was made by correspondence to do two things. First, to suggest a few basic principles by which workers engaged in clinical investigation of chemotherapeutic agents in the treatment of tuberculosis in humans may be guided. Second, to correlate and summarize the results of the various clinical investigators of chemotherapy in tuberculosis during the past year which have come to our attention.

With regard to the first objective, the following standards of procedure are suggested:

First, before any drug is used in man, it must be thoroughly investigated in animals; this study to include both its therapeutic effectiveness and toxic reactions. The agent must have the ability to restrain, arrest or overcome well established tuberculosis in experiment animals.

Second, it must then be tried cautiously on patients whose consent for such trial has been obtained after fully acquainting them as to the purpose and possible dangers of such a study.

Third, the investigation should be done in an institution where adequate facilities for observation and laboratory studies are available.

Fourth, the fresh exudative lesion should be the one of choice for studying the effects of a chemotherapeutic agent. If a fresh exudative process is not favorably affected by the chemotherapy, we can scarcely expect an old fibroid-caseous lesion to respond. Bacteriological proof of tuberculosis should be present.

Fifth, it is very desirable to have a group of similar patients, not receiving chemotherapy, to serve as a control group.

Sixth—Dosage. A drug cannot be discarded as being ineffective until ample trial of its maximal tolerated dose proves it such. The method of administration should be similar to that which has achieved results in experimental animals.

Seventh, all cases receiving any collapse therapy should be excluded from those receiving the chemotherapy.

Eighth, chemotherapy should be administered for from 90 to 120 days with maximal tolerated dose. If the agent is beneficial there should be evidence of this benefit within that period of time.

Ninth, it is desirable for several sanatoria in different parts of the country to carry on studies simultaneously using in general the same technique of administration. In this way each drug could be evaluated in the shortest possible time.

Tenth, it is extremely important to avoid publicity in the lay press regarding any drug under investigation until its effectiveness is well established by thorough clinical trial.

It is difficult to summarize briefly the clinical results of the men investigating chemotherapeutic agents.

There has been a great deal of interest in Diasone as a chemotherapeutic agent during the past year and a half. In an endeavor to summarize the results of the different workers who have investigated Diasone clinically, this committee sent letters to these workers, asking their

Dr. Minnig of Denver writes: "We have no industrial law pertaining to occupational diseases in Colorado. As you know, Colorado has a great many mines and there certainly is considerable silicosis." The Society in Colorado has appointed a committee, of which Dr. Louis V. Sands is the chairman, to work out suitable occupational disease laws. He states that he knows the Industrial Commission is very favorable towards an occupational disease law.

The work of this Committee has only begun and this report cannot give a complete picture of the present status in each state nor any suggestions as to what national occupational laws might be suggested. It will be necessary that we get a reply from every state in the Union and it will also be necessary to compile these various reports in complete form so that a uniform suggestion can be made.

It has been very difficult to carry on very much of this work during the past year because of the added work which we have taken on because of the war. Some of this Committee work must necessarily be postponed for the time being. However, we promise that in the coming year, an attempt will be made to compile the report submitted to all Committee members for their suggestions, and have the complete report with suggestions available at our next College meeting.

If any of the members of the College now in session have any suggestions regarding the occupational laws in their states, we would appreciate if they would send such suggestions to any member of the Committee so that they may be included in our future report.

Louis Mark, M.D., Columbus, Ohio, *Chairman*

William E. Chester, M.D., Detroit, Mich.

Leopold Bradhy, M.D., New York, N. Y.

J. V. Foster, M.D., Harrisburg, Pa.

R. L. Laney, M.D., Joplin, Missouri

W. Bernard Yegge, M.D., Denver, Colo.

Paul A. Turner, M.D., Louisville, Ky.

Upon motion by Dr. Strohm, seconded by Dr. Hayes, this report was accepted by the Board of Regents.

Report of the Committee on State Laws for Tuberculosis

In accordance with your kind endorsement at the meeting held at St. Louis in November 1944, the Committee on State Laws for Tuberculosis collected and reviewed the Health Laws and Statutes of the 48 states and the District of Columbia for the purpose of obtaining a preview of the management of the tuberculosis problem in general, and the care and treatment of open cases of pulmonary tuberculosis in particular.

Additional information was received through correspondence with Tuberculosis Controllers and State Health Officers in various parts of the country and with Fellows of the College who generously supplied us with pertinent reports.

The analysis of this data permitted us to compile a summary, the outline of which is herewith respectfully submitted to the Board of Regents.

It is gratifying to note that specific laws for the isolation of recalcitrant open cases of tuberculosis have been enacted in 22 states and in the District of Columbia. In addition, in five states compulsory isolation of uncooperative tuberculous patients is being carried out under

General Health Laws which pertain to the control of communicable diseases. This means that there are adequate laws for the protection of the community from known tuberculosis carriers in 27 of our states and also in the District of Columbia.

However, this data is presented with the qualification that, for various plausible reasons which are too lengthy to be discussed at this time, in none of these states is the enforcement of these laws being carried out on a large scale.

In some of the above mentioned states other preventive measures are also invoked, such as a quarantine of the patient or placarding his home.

Furthermore, we have found that only a quarantine of the patient is carried out in three states, and only placarding of the patient's home in one state. In four states attempts are being made to handle this whole issue under the general health laws, but without enforcing isolation.

In the remainder of the states, there are no special laws for the segregation of tuberculous patients who are a menace to the community, first, because their disease is in the communicable stage, and secondly, because they are careless and negligent as far as the protection of the health of others is concerned.

The original State Laws and Statutes we have gathered are available for the membership of the College through the office of the Executive Secretary.

The original compilation of the Tuberculosis Laws with annotations as prepared by this Committee could be made available for the Fellows of the College and for all others who are interested in this subject, provided it is authorized by the Board of Regents.

Andrew L. Banyai, M.D., Wauwatosa, Wisconsin, *Chairman*

Joseph E. Blum, Jr., M.D., Greenwell Springs, La.

Willard B. Howes, M.D., Detroit, Mich.

J. George Lang, M.D., New York, New York

Upon motion by Dr. Mark, seconded by Dr. Turner, this report was accepted by the Board of Regents.

Report of the Scientific Program Committee

Inasmuch as there could be no annual meeting of the College this year, our plans for the scientific program which were being developed will be carried over for the next annual meeting. We will direct all our efforts into making this program one of excellence so as to retain the reputation of the College for its high standards in the presentation of scientific programs.

Minas Joannides, M.D., Chicago, Illinois, *Chairman*

Maj. Gen. S. U. Marletta, U.S.A., Washington, D. C.

Ralph C. Matson, M.D., Portland, Ore.

Upon motion by Dr. Overholt, seconded by Dr. Mark, this report was accepted by the Board of Regents.

Memorandum to the Board of Regents

The American College of Chest Physicians

At the last meeting of the American College of Chest Physicians in session at Chicago, Illinois, Dr. Jerome S. Peterson of New York City and I were so much impressed with the sympathetic attention given to the Negro tuberculosis program that we were inspired to call it to the attention of many other physicians of our group. As a result of personal conference and correspondence it was decided that we ask the Board of Regents to urge the College to manifest some special interest in the tuberculosis problem of the Negro.

In the past 40 years among the white group tuberculosis has been reduced as a cause of death from 1st to 7th place. During the same period the Negro group has been able to reduce tuberculosis from 1st to 2nd place. This disparity in the mortality rates of the two groups is so great that it is obvious that the Negro's plight warrants concentrated effort. In the 1940 Census, Negroes comprised 9.8 per cent of the total population. Of 60,428 deaths from tuberculosis (all forms), 15,883 deaths or 26 per cent were Negroes. With these 15,883 deaths from tuberculosis, only 7,066 beds were available. In view of the high morbidity and mortality rates from tuberculosis among Negroes we urge that the quota system be discarded and provisions be made to hospitalize patients, white and Negro, on the basis of mortality and morbidity rates of a given area.

We note with interest the Thomas-Bulwinkle Bill designed to create a Division of Tuberculosis Control within the U. S. P. H. S. with an appropriation of \$10,000,000 for the work. We sincerely hope that the College can find it possible to urge that a relative portion of these funds be used among Negroes where so large a part of the tuberculosis problem exists. It is further desired that competent Negro personnel participate in the administration of this division. Since the eventual control and eradication of tuberculosis depends in a large measure upon early diagnosis, adequate training of the Negro physician is prerequisite No. 1. This training can be secured in part as follows:

1. The Tuberculosis Institutes conducted by the National Tuberculosis Association. These Institutes are doing a Herculean job but are handicapped by the lack of a sufficient number of men trained in the field of tuberculosis.
2. Assistance and support for undergraduate training at Howard University Medical School and Meharry Medical College will aid the young doctor to start out more tuberculosis conscious.
3. Admission of the Negro physicians to staffs of existing tuberculosis hospitals will offer an excellent opportunity for their development and training in clinical tuberculosis and in case finding. This can be arranged according to local conditions with great benefits to all.
4. Finally, we plead for the selection of several strategic centers prepared for a long range program of training for Negro physicians. First, a 5 year plan whereby an adequate number of men be trained in chest Roentgenology and Pneumothorax, and a second 5 year plan devoted to training a desired number of men in Bronchoscopy and Chest Surgery.

The situation at Meharry Medical College is an illustration of the need for concentrated effort by groups and individuals. During the year 1943-44, 252 students were enrolled in the Medical Department. Eight clinical beds, occasional use of 6 semi-private beds and a small chest clinic offer all the opportunity that they have in securing clinical training in the diagnosis and treatment of tuberculosis in this country. The gigantic burden of combatting these nearly 16,000 deaths from tuberculosis among Negroes now rests mainly upon the shoulders of inadequately trained Negro physicians. That lack of thorough training and experience in early diagnosis and detection is a definite factor in the disproportion shown by statistics in the diseases cannot be doubted.

In the capacity of a domestic servant the Negro is apt to be a potential carrier of dangerous, yet unsuspected, active tuberculosis. Of the 4,479,068 employed Negroes in the United States in 1940, 1,003,508 or 22 per cent were employed in domestic service. The tuberculous Negro is not only a menace to his own but to the white group as well.

The College could do much toward improving training opportunities for preparing the Negro physician by advocating more Fellowships and opportunities for training men to conduct the Tuberculosis Institutes mentioned above and by urging its members who are engaged in hospital or dispensary administration to take on Negroes in house staff and visiting positions. We are eager to work side by side with you for the common good of all. We hope that this program will meet with your approval so that we may have a greater opportunity to serve all Americans.

William A. Beck, M.D.

Professor of Clinical Medicine
Meharry Medical College
Nashville, Tennessee

The above memorandum from Dr. Beck was referred to the Council on Public Health of the College.

College Award

BE IT RESOLVED: That the American College of Chest Physicians originate, prepare and bestow a medal or other honorarium upon a person or persons who have made an outstanding contribution in the field of chest diseases. These awards are to be made annually, whenever possible, and the ceremony in connection with the presentation of the award is to be conducted at the time of the annual meetings of the American College of Chest Physicians.

BE IT FURTHER RESOLVED: That the interest derived from the Endowment Fund of the American College of Chest Physicians, invested by the College in U. S. War Bonds or in other securities, be utilized to defray the cost of the awards. The President of the College is hereby authorized to appoint a committee of three or more members of the College whose duties it shall be to gather and submit plans to the Board of Regents for a suitable medal or other honorarium.

The above resolution was moved for adoption by Dr. Holinger, seconded by Dr. Peabody, and unanimously passed by the Board of Regents.

Resolutions

FELLOWSHIP CERTIFICATES

BE IT RESOLVED: That the Chairman of the Board of Regents of the College notify all new Fellows who are to receive their Fellowship Certificates to present themselves in person at the annual meeting of the College to be held in 1946 for the purpose of participating in the Convocation exercises and receiving their Fellowship Certificates.

BE IT FURTHER RESOLVED: That in the event the meeting for the year 1946 be cancelled that the Chairman of the Board of Regents through the office of the Executive Secretary of the College be authorized to present the certificates through the mail to all Fellows who are entitled to receive same.

Upon motion by Dr. Hayes, seconded by Dr. Holinger, the above resolution was adopted by the Board of Regents.

The following physicians passed the written examination for Fellowship in the American College of Chest Physicians which was held in June, 1945:

Adams, Ralph H., Boston, Mass.
 Anderson, Norman L., Black Mountain, N. C.
 Biber, David, Union, N. J.
 Brasher, Charles A., Mt. Vernon, Mo.
 Briggs, John F., St. Paul, Minn.
 Caldwell, David M., Pittsburgh, Pa.
 Challen, Alice A., Alameda, Calif.
 Cremer, J. A., Denver, Colo.
 Crist, Charles G., Gettysburg, Pa.
 Cutler, Herman S., Staten Island, N. Y.
 DePinto, Dominic A., Chicago, Illinois
 Diamond, Norman, Bronx, New York
 Edwards, Howard K., Miami, Florida
 Greenwell, James O., Redwood City, Calif.
 Hammitt, F. C., Peoria, Illinois
 Harkness, James T., Berkeley, Calif.
 Hirsh, Leon H., Milwaukee, Wisc.
 Hudson, Henry A., Marblehead, Mass.
 Katz, Harry L., Fort Dix, N. J.
 Klosk, Emanuel, Newark, N. J.
 Latz, Leo J., Chicago, Illinois
 Loewen, David F., Decatur, Illinois
 McCracken, Robert, Nashville, Tenn.
 Milham, Claude G., Hamlet, N. C.
 Sherman, David, Brookline, Mass.
 Stemmerman, Marguerite, Huntington, W. Va.
 Taugher, Lawrence, Louisville, Ky.
 Waterman, David H., Knoxville, Tenn.
 Weissman, Herman, Legion, Texas
 Yellin, Daniel, San Francisco, Calif.
 Young, Henry, New York, N. Y.

	Candidates	Per Cent
Passed	31	82%
Failed	7	18%
TOTAL	38	100%

H. I. Spector, M.D., St. Louis, Mo., *Chairman*, Board of Examiners
 Edward W. Hayes, M.D., Monrovia, Calif. William F. Rienhoff, Jr., M.D., Baltimore, Md.

College Chapter News

ILLINOIS CHAPTER

The Illinois Chapter of the American College of Chest Physicians cooperated with the British Information Services in presenting a film on "Surgery in Chest Diseases" at the International Relations Center, Chicago, Illinois, August 29, 1945.

ARGENTINA CHAPTER

Professor Raul F. Vaccarezza, F.C.C.P., Buenos Aires, Governor of the College for Argentina, has been elected President of the First Argentine Congress of Phthisiology which will be held in Buenos Aires, November 25-30, 1945. Dr. Tomas de Villafane Lastra, F.C.C.P., Cordoba, and Dr. Antonio Cetrangolo, Buenos Aires, were elected Vice Presidents. Dr. Guido Pollitzer, F.C.C.P., Buenos Aires, was elected Secretary of this Congress.

Dr. Jose Peroncini, Buenos Aires, has been appointed by the government as Chief of the Anti-tuberculosis Bureau, a branch of the National Department of Public Health.

BRAZIL CHAPTER CONDUCTS POSTGRADUATE COURSE

Under the auspices of the Brazilian Chapter of the American College of Chest Physicians, a postgraduate course on tuberculosis was given by the members of the Tuberculosis Services of the Polyclinic General Hospital of Rio de Janeiro. Participating in the course were Profs. Affonso MacDowell, F.C.C.P., Samuel Libanio, F.C.C.P., Aresky Amorim, F.C.C.P., Manuel de Abreu, Reginaldo Fernandes, F.C.C.P., and E. Somogyi Senior. Also participating in the course were Drs. MacDowell Filho, Olimpio Gomes, Joao Vizella, Carvalho Ferreira, Henri Jouval, Paulo Marchese, and Erotides A. Nascimento. The course was for a period of three months.

College News Notes

Dr. Leo Eloesser, F.C.C.P., San Francisco, was one of four American physicians recently to receive honorary membership in the Comite Nacional de Lucha Contra la Tuberculosis, Mexico.

Lt. Col. Brian B. Blades, F.C.C.P., St. Louis, Chief of the Thoracic Surgical Section of Walter Reed General Hospital, Washington, D. C., has been appointed consultant to The Surgeon General in thoracic surgery.

Dr. Evarts A. Graham, F.C.C.P., St. Louis, Missouri, was a member of a committee which on May 31 called on the President of the United States in order to present to him a memorandum dealing with the supply of premedical and medical students, and physicians. Attention was

called to the increased need of physicians by the civilian population, the Veterans Administration and the armed forces in the years to come. Within the next year the number of admissions of freshmen to medical schools will be reduced by about 5,000 because of the existing policies, and a corresponding reduction in the available physicians will follow. A complete memorandum is being forwarded directly to the President at his request in order to place all the facts before him.

Dr. Alton Ochsner, F.C.C.P., New Orleans, Louisiana, presented a paper on "Surgical Treatment of Empyema" at the DeWitt General Hospital, Auburn, California, September 15, 1945.

Lt. Col. Leo V. Schneider, F.C.C.P., Glenn Dale, Maryland, was recently appointed Chief of Industrial Medicine at the New York Port of Embarkation.

Commander A. Worth Hobby (MC) USNR, F.C.C.P., Atlanta, Georgia, discussed "Pulmonary Tuberculosis" before the Wartime Graduate Medical Meeting held at the U. S. Naval Hospital, Corona, California on August 9th.

Dr. Edwin J. Simons, F.C.C.P., Swanville, Minnesota, was elected President of the Minnesota State Medical Association at a meeting of the House of Delegates at St. Paul, May 19-20. He will take office on January 1, 1946.

Dr. Nelson W. Stroh, F.C.C.P., Buffalo, New York, Regent of the College, was appointed to the Medical Committee on Grievances by the State Board of Regents of the New York State Department of Education.

Dr. Forrest J. Pinkerton, Honolulu, Chairman of the Public Health Committee for Honolulu, has announced the formulation of a plan to coordinate all of the public health activities in Honolulu through the Public Health Committee.

Dr. U. E. Zambarano, F.C.C.P., Providence, Governor of the College for Rhode Island, discussed "Tuberculosis in Industry and the Efforts Being Made Toward the Discovery, Prevention, and Spread of this Disease" at the New England Conference of the American Association of Industrial Physicians and Surgeons, Pawtucket, Rhode Island, May 2, 1945.

Dr. Paul H. Holinger, F.C.C.P., Chicago, discussed "Bronchoscopic Diagnosis and Approach to Tumors of the Chest," and Dr. Willard Van Hazel, F.C.C.P., Chicago, discussed "Surgical Treatment of the Chest" at a meeting of the Racine County Medical Society, Racine, Wisconsin, on April 26, 1945.

Dr. H. H. Christiansen, F.C.C.P., Wausau, Wisconsin, lectured on "The Treatment of Advanced Tuberculosis" at the meeting of the Wisconsin Surgical Club held at St. Mary's Hospital, Wausau, on June 16.

Dr. Frank R. Ferlaine, New York City, discussed "Recent Developments in the Use of Penicillin and the Newer Anti-biotics in the Treatment of Infections" before the Franklin County Medical Society at Saranac Lake.

Dr. James L. Mudd, F.C.C.P., St. Louis, Missouri, presented a paper on "Empyema" at the annual meeting of the Iowa-Illinois Central District Medical Association held at Davenport, Iowa, May 24, 1945.

WEST VIRGINIA APPOINTS TUBERCULOSIS COMMITTEE

The National Council of Tuberculosis Committees of the American College of Chest Physicians is pleased to announce that the By-Laws of the West Virginia State Medical Association were amended to provide for the appointment of a standing committee on tuberculosis. The following physicians were appointed to serve as members of the Tuberculosis Committee of the West Virginia Medical Association:

Dr. David Salkin, F.C.C.P., Hopemont, *Chairman*

Dr. E. T. Goff, F.C.C.P., Parkersburg

Dr. J. N. Reeves, Charleston

Dr. G. E. Gwinn, F.C.C.P., Beckley

Dr. Elizabeth McFetridge, Shepherdstown

CONGRESS APPROPRIATES SIX MILLION DOLLARS FOR TUBERCULOSIS CONTROL

The sum of \$6,047,000 was appropriated by Congress for tuberculosis control according to Public Law 410-78th Congress, Section 314-b for the fiscal year ending June 30, 1946. This sum will be expended under the Tuberculosis Control Division of the U. S. Public Health Service.

Of this amount \$5,200,000 is to be used for grants to States to develop their field control program exclusive of the construction and maintenance of sanatoria during this first full year of operation. The remaining \$847,000 is to be used for research in all fields of tuberculosis control, demonstration of tuberculosis control by means of 20 field units (including complete x-ray equipment for mass radiography, a medical officer, a nurse, two technicians, and a record analyst). These units are loaned to State and local health departments to demonstrate case-finding and follow-up in those areas which do not have the personnel and facilities. Additional studies are carried on in the field of radiology, case-finding, medical care, after care, and follow-up.

Dr. Herman E. Hilleboe, F.C.C.P., Medical Director, Chief, Tuberculosis Control Division, Washington, D. C., will be in charge of this program.

STALINGRAD REESTABLISHES TUBERCULOSIS HOSPITAL

The Germans destroyed every hospital in the Stalingrad region. Since then, a tuberculosis hospital with 100 beds and a regional tuberculosis dispensary have been reestablished and are again functioning. Within the first few months after liberation of Stalingrad 286 doctors and 224 nurses and doctors assistants were sent to Stalingrad. Large quantities

of essential medical equipment were supplied including four x-ray machines, 21 ambulances, and 42,000 rubles worth of surgical instruments and other supplies.

The State granted huge sums for health protection measures. Expenditures on capital repairs and the restoration of the wrecked medical network in 1943 amounted to 1,485,000 rubles; in 1944, 4,440,000 rubles and in 1945, 2,957,000 rubles. Expenditures on new construction in 1943 were 5,526,000 rubles, in 1944, 4,970,000 rubles; and in 1945, 4,900,000 rubles.

PHILIPPINE RELIEF

Requests have been received from Fellows of the College in the Philippines for medical and surgical equipment needed by them to reestablish their offices and clinics. The Japanese invaders have pillaged and destroyed all of the equipment in the doctors' offices and there is dire need for pneumothorax apparatus, fluoroscopic and x-ray equipment, surgical instruments and other medical equipment and supplies. If any of the members of the College can donate used equipment or if they wish to contribute to a fund for the purchase of used equipment to be shipped to the Fellows of the College in the Philippines, kindly communicate with Dr. Joseph C. Placak, F.C.C.P., 10515 Carnegie Avenue, Cleveland, Ohio, Chairman of the College Committee for Philippine Relief. Checks should be made payable to Dr. Joseph C. Placak, Chairman of the Committee for Philippine Relief.

SPECIAL ISSUE OF JOURNAL

The November-December issue of the journal will be a special issue to commemorate the 50th anniversary of the discovery of the x-ray by Konrad Roentgen. The issue is being compiled under the direction of Dr. Andrew L. Banyai, F.C.C.P., Wauwatosa, Wisconsin and the following articles will appear:

"The Roentgen Ray—Its Past and Future," by Dr. Russel H. Morgan and Dr. Ira Lewis, United States Public Health Service.

"Roentgen Visualization of the Lesser Circulation, or Roentgen Visualization of the Reticuloendothelial System of the Lung," by Dr. C. C. Macklin, University of Western Ontario, London, Canada.

"Radiological Anatomy of Segmental Lesions of the Lung," by Dr. Clifford Hoyle, Editor of the *British Journal of Tuberculosis and Diseases of the Chest*, and Dr. Foster Carter, London, England.

"Oblique and Lateral Views of the Chest in Roentgenological Diagnosis," by Dr. Samuel Brown, University of Cincinnati.

"Benign Tumors of the Pulmonary Apex, Their Roentgenological Diagnosis," by Dr. L. W. Paul, University of Wisconsin.

"Clinical Value of Angiocardiography," by Dr. Henry K. Taylor, New York City.

"Roentgen Treatment for Hodgkin's Disease and Lymphosarcoma of the Chest," by Dr. A. U. Desjardins, Mayo Clinic, Rochester, Minn.

Orders for additional copies of this issue of the journal should be placed as early as possible.

**MEDICAL SERVICE BUREAU ESTABLISHED
AT COLLEGE HEADQUARTERS**

In accordance with a resolution adopted by the Board of Regents of the College at their annual meeting held in Chicago on June 17, 1945, a Medical Service Bureau has been established at the Executive Offices of the College for the purpose of serving the members of the College being released from the armed forces.

The Bureau would appreciate receiving information from the medical superintendents of sanatoria regarding positions available at their institutions, together with full particulars as to the type of position and salary offered. Fellows of the College who are looking for assistants should send complete information to the Bureau.

Physicians being released from the armed forces who are seeking appointments and positions should send complete information to the Bureau regarding their training and the type of position desired.

Please direct all correspondence to the Medical Service Bureau, American College of Chest Physicians, 500 North Dearborn St., Chicago 10, Illinois.

Obituary

WILLIAM FREDERICK BENNETT

1877 — 1945

Dr. William Frederick Bennett died of a cerebral apoplexy at Verona, New Jersey, where he was first assistant physician at the Essex Mountain Sanatorium. He was born on September 28, 1877 at West Nanticoke, Pennsylvania. He attended the Harry Hillman Academy at Wilkesbarre, Pennsylvania and the University of Pennsylvania Medical School. Dr. Bennett interned at the Wilkesbarre City Hospital and later entered private practice at Scranton. After the period spent in private practice, Dr. Bennett became interested in state clinics and spent some time at the Pennsylvania State Sanatorium for Tuberculosis at Hamburg. In 1923 he joined the staff of the Essex Mountain Sanatorium and became first assistant physician there in 1928, where he remained up until the time of his death.

Dr. Bennett was a Fellow of the American College of Chest Physicians and also a member of the American Medical Association, the Essex County Medical Association, Delta Epsilon Fraternity, the Masons and the Elks. He was not married and had no immediate relatives.

Marcus M. Newcomb, M.D., *Governor*
American College of Chest Physicians.

Abstracts

PROBLEMS OF TUBERCULOSIS, No. 1, 1943

Narkomzdrzv S S S R Medghiz. Mosva

- T. P. Krasnobaev. "Twenty-five years of the struggle against osteo-articular tuberculosis in the Soviet Union." P. 23.
- *A. E. Rabukhlin. "Information concerning the effectiveness of artificial pneumothorax." P. 30-38.
- A. E. Prozorov. "Roentgen diagnostics of the primary tuberculous pneumonia." P. 38.
- *F. A. Mikhailov and A. M. Lunklevich. "On the exceptional number of pleural pockets in initial artificial pneumothorax." Pp. 46-50.
- D. A. Manucharlan. "On the indications to thoracoplastics in the tuberculosis." P. 50.
- *V. G. Stefko. "Pneumonia following wounds and other trauma." Pp. 53-59.
- F. L. Shpanir. "To the methods of the chemo-therapeutical experiments in tuberculosis." P. 59.
- *B. M. Gorodetsky. "On the surgical treatment of penetrating gunshot lesions of the thorax. (Preliminary communication)." Pp. 65-67.

Effectiveness of Artificial Pneumothorax.—The author presents a survey of the results of artificial pneumothorax from the literature. Roloff analyzed results of this treatment in 9,000 patients in various sanatoria, dispensaries, and hospitals in the United States, Russia, and Japan and could come to no definite conclusion. Results measured by clinical care and rehabilitation ranged from 7 to 66 per cent, improvement from 21 to 78 per cent, negative sputum from 21 to 38 per cent. It was impossible to make any comparison because of the wide variation and difference in the criteria for diagnosis and cure, the age, social condition, and the type of treatment. A group of Russian cases, 13,000 in number, were reported to have good results in 45 per cent of the cases.

This study was made on 2,102 adult tuberculosis patients who were observed for a long period in three dispensaries. Of these, 1741 were treated by unilateral and bilateral pneumothorax and kept under observation for at least one year. The remaining 361 patients did not receive artificial pneumothorax because of obliteration of the pleural cavities, or were treated for short periods of time (up to three months). This group served as a control. They did not differ markedly from the 1741 in age, sex, and background.

The bulk of the patients in both groups suffered from fresh and infiltrating forms of the disease and had had positive sputum not longer than three months before institution of the artificial pneumothorax. Unilateral disease was noted in 70.5 per cent of the treated cases and 77.3 per cent of the control cases and bilateral disease in 29.5 per cent of the treated cases and 22.7 per cent of the control cases. Regular sanatorium treatment was given more frequently in the control cases although the difference was not very great (60 per cent of the control cases and 40 per cent of the treated cases).

The author draws the following conclusions:

1. There is no advantage in administering artificial pneumothorax longer than 5 years as compared with treatment of 3 to 4 years' duration. In initial infiltrating pneumonic forms of tuberculosis, in the absence of pleural adhesions, and where bacilli disappear rapidly from the sputum, a possible therapeutic effect is obtained after artificial pneumothorax for 1½ to 2 years.
2. For deciding the length of time in which artificial pneumothorax is to be given, a strict evaluation of each individual case must be made. This should also be done when collapse therapy is used in elderly patients.
3. Advanced age is not a contraindication for pneumothorax. Most of the author's cases in this age period (90 patients were over 45 years of age) reacted as well as young persons and sometimes better. Nevertheless, the patients were selected, as much as possible, on the basis of having early, mostly infiltrating forms of tuberculosis, and strict attention was paid to the state of their cardiovascular system. Pneumothorax was not instituted in pronounced myocarditis, arteriosclerosis, emphysema, or diffuse prolonged bronchitis.

Pleural Pockets in Initial Artificial Pneumothorax.—In initial pneumothorax where no gas is instilled, it is frequently noted on the next examination that there is an accumulation of gas of greater or lesser extent in the pleural space. In another group of primary pneumothoraces where 300 to 250 c.c. of gas is used, a formation of large pockets of gas was noted frequently. Most authors have attributed this to a tear or penetration of the visceral pleura. This has been most frequently reported in bilateral pneumothorax although quantitative proof of the reason for the exceptional number frequently seen in this group have not as yet been given.

The authors performed experiments by the method of Auguste and Pluchar. This method is used to recognize a tear or a fistula through the visceral pleura. The technic is to insert into the pleural space some substance with a strong odor. In this case it was peppermint oil. If a bronchopleural fistula is present, the odor is detected on the breath of the patient.

This technic was done on 112 patients. Gas filtered through cotton saturated with mint oil was instilled into the pleural space. Patients were questioned as to the odor. Of the entire group of 112, oil was detected in 5 cases. The conclusion was drawn from this that the formation of large pneumothorax pockets following initial pneumothorax insufflation, is caused by the diffusion of the sterile blood gases from the pleural capillaries and that this is not infected air from the bronchial system following trauma to the visceral pleura by the needle in pneumothorax.

Pneumonia Following Wounds.—From the author's own experience and from data from the literature, the following conclusions are drawn:

1. Pneumonia is quite a common complication of wounds.
2. Two anatomic-pathologic types of pneumonias can be distinguished:
 - a) the acute form with massive lysis of the lung tissue, mainly as a result of fermentative action of some anaerobes (*B. histolyticus*, *B. oedematus*) in association with other microbes, and
 - b) subacute, with a prolonged course, so-called "splenization" pneumonia, in which the process is localized in the lymphatics of the lung tissue.
3. From the microscopic point of view, in more than half of the cases, attention is drawn to the participation of the anaerobes, in different combinations (pathogens as well as non-pathogens) what in many respects explains the character of the lung tissue reaction.

Surgical Treatment of Penetrating Gunshot Lesions of the Thorax.—On the basis of the author's 60 cases, of which the average observation lasted for 11.2 days per patient, the following conclusions are derived:

1. Repeated suturing of open pneumothorax, beginning from the second day, is of no value.
 2. Blood in the pleural cavity can be aspirated, even in large amounts at one time, from the 4-5th day on.
 3. In the case of empyema and in the absence of bronchial fistulae, the pleural cavity can be washed with a 8:1000 solution of streptocide.
 4. Washing of the pleural cavity with streptocide is indicated also in the post-operative period when the temperature is high and the pus is not draining.
-

Book Reviews

Radiation and Climatic Therapy of Chronic Pulmonary Diseases with Special Reference to Natural and Artificial Heliotherapy, X-Ray Therapy, and Climatic Therapy of Chronic Pulmonary Diseases and All Forms of Tuberculosis. Edited by Edgar Mayer, M.D., F.A.C.P., F.C.C.P., Assistant Professor of Clinical Medicine, Cornell University Medical College, New York, Cloth. Price \$5.00. Pp. 393, with illustrations. Baltimore: Williams and Wilkins Company, 1944.

This is a timely volume since the author has had a long experience in this field and is qualified to select the twenty-three authors who contributed the chapters dealing with the utilization of light, x-ray and climatological therapy in the treatment of chronic pulmonary diseases as well as all forms of tuberculosis.

Dr. Mayer presents an excellent summary of climate, x-ray and light therapy in the treatment of all types of chronic pulmonopathies. The book contains the latest and most authentic information on the subjects presented and is highly recommended to both the chest specialist and the general practitioner.

James T. Speros.

Diseases of the Chest by Robert Coope, M.D., B.Sc., F.R.C.P. 524 pages, 160 illustrations. The Williams and Wilkins Co., Baltimore. First Edition, 1944. Price, \$7.50.

This textbook is "Described for students and practitioners," and can be studied with profit by both. In a lucid style indicative of mastery of all phases of the subject the author correlates various aspects of pulmonary disease oftentimes considered in separate texts and courses, i.e., acute and chronic, medical and surgical. Likewise the concepts of bronchial physiology and finer anatomy in relation to such matters as collapse of the lung and obstructive emphysema are made to seem simple rather than mysterious.

The weary medical student will applaud Dr. Coope's courage in quietly disposing of Kronig's bands and Wintrich's tones, and his admirable clarification of such incidentals as the "Pancoast tumor" and "plastic bronchitis."

On the other hand student and practitioner alike may question the justification for devoting the better part of a chapter to an excellent description of the classical picture of essentially untreated pneumococcus lobar pneumonia, a pretty rare sight nowadays, but only two pages to sulfapyridine treatment, one paragraph to sulfathiazole and sulfadiazine, and practically no space to the clinical course of the disease under sulfa medication. The use of penicillin postdates the book.

The chapters on "The Pneumonias" are noteworthy writing nevertheless. The reader is moved to self-analysis by the author's caustic comments on the use of the terms "atypical pneumonia" and "pneumonitis" to cover the puzzlement of the man who sees x-ray shadows he does not understand.

It is in the chapters on bronchiectasis, lung abscess, and bronchial carcinoma that the author's breadth of experience is so apparent. His plea for "carcinoma consciousness" is a valuable contribution to medical education.

The chapter on chest injuries closely follows the author's book, "War Injuries of the Chest," hence is terse and timely. The sections on tuberculosis, pneumothorax, pleurisy, empyema, and asthma are in keeping with accepted thought.

There is an atlas of representative x-ray films. The diagrams are good, especially those illustrating the anatomy of the "respiratory districts." The format is commendable. It is a pleasure to recommend this book most highly.

Sheldon Domm, Lt. (jg) MC USNR.

Principles and Practices of Inhalational Therapy. By Alvan L. Barach, M.D. Publisher: J. B. Lippincott Company, Philadelphia, Pa. Price \$4.00.

This is a presentation of much importance to all those engaged and interested in a highly specialized field of therapeutics which, up until the present time has been somewhat neglected in book form. It is a far cry and a striking advance from the concepts of the ancients mentioned in the Berlin Papyrus until the present, which was that air was supposed to "travel by the arteries and on entering the nostrils was believed to penetrate to the heart and internal organs and to supply the whole blood abundantly."

As in the present, even then there was some confusion of ideas as exemplified by the idea that "there are four vessels for his two ears—the breath of life enters by his right ear and the breath of death by his left ear."

These misconcepts concerning oxygen, carbon dioxide, etc., and their utilization by the body have carried on right up until the present as a heritage bequeathed to us as a legacy—right down to our own grandmothers with their croup kettle, and to the lonely Indian on his reservation, inhaling steam from hot stones for typhoid fever.

Readers will find in the various chapters contained in the book, many of the results of modern researches in "Inhalational Therapy" correlated with their pathologic physiology and clinical application. Some of the chapters are brief owing to the difficulty in covering such a wide field, but this is compensated for by extensive bibliographic references. While some of the conclusions are based on too few cases, such as the statement that "five out of seven cases of advanced bilateral pulmonary tuberculosis achieved a state of complete arrest or clearing of active tuberculosis," the author, himself, forestalls a certain amount of criticism by stating elsewhere that "controlled investigation is unquestionably necessary to confirm many of the tentative conclusions advanced."

An adequate summarization of this book is somewhat difficult as there is so much informative material in every chapter touching upon so many phases of "Inhalational Therapy."

Other than the text covering "Inhalational Therapy," the central idea of the book seems to be the effort to correlate symptoms with the pathological processes, which is the ideal objective to be attained in all teaching of pathology. Under various headings covering many diseases an effort is made to explain symptoms through altered mechanisms as a result of the pathology. In noting the manner in which this is done in this book, many pathologists who conduct the popular weekly "pathological conferences" would be aided in their explanations of the "why" and "how" of various symptoms.

A great many of the most important points are brought to light in the discussion of pathologic physiology, particularly in the chapters devoted to Pneumonia, Congestive Heart Failure, Coronary Thrombosis and Coronary Sclerosis, Bronchial Asthma, Pulmonary Emphysema, Acute Altitude Sickness, Acute Anoxia, and Shock, after which discussion there is extensive discussion in inhalational therapy in each of these various processes.

The comments in the chapter "Some Considerations Concerning Research in Respiratory Function and Inhalational Therapy" are particularly pertinent.

The basis for their comment on pathologic physiology and the rationale for treatment is well substantiated by an enormous amount of experimental research. Carbon dioxide and oxygen in particular are very vital and necessary substances for bodily needs in the presence of pathologic processes and altered physiology, and the importance of the manner in which the substances are administered to the body can not be overestimated.

To anyone interested in any phase of the material presented in the various chapters, the book will be an important reference work. Careful application of the many details in therapy will do much to alter the casual order given in many hospitals to "put him in the Tent" or "take him out."

Marr Bisailon, M.D.

Editorial

As the world returns to a peace time economy, we are thinking of the physicians who are soon to be released from the military services. The Board of Regents of the College had made advance plans for the establishing of a Medical Service Bureau, as announced in this issue of the Journal, and there are a number of positions now available in sanatoria and in private practice for qualified chest specialists. Physicians interested in these positions are requested to write to the Executive Offices of the College at Chicago for detailed information.

It is with much pleasure that we acknowledge receipt of the following telegram from Dr. Antonio Navarrete, College Regent in Cuba:

"Cuban Chapter joins College in rejoicing great victory."

That the College is the leading international society of chest specialists is further evidenced by the receipt of the following applications from our eastern allies, China and Australia:

J. Ancheng Miao, Kunming, Yunnan, China.

Timothy C. H. Liang, Hwei-yang, Kwang-tung, China.

Timothy Chien Yi Sun, Kunming, Yunnan, China.

Kuang Hung Tsing, Kunming, Yunnan, China.

Charles G. Bayliss, Sydney, New South Wales, Australia.

Campbell Young Bland, Waterfall, New South Wales, Australia.

We are looking ahead to the rapid demobilization of physicians whose services are no longer needed by the army and navy. It is our desire that they be returned to their homes and families with the least possible delay.

—C. M. H.

NOTICE

ANNOUNCEMENT OF SPECIAL COURSE
IN BRONCHO-ESOPHAGOLOGY

October 15-27, inclusive, 1945

It will be noted that this special course will follow the Refresher Course in Otolaryngology, enabling those who can spare the time to pursue both courses in sequence on the same visit to Chicago.

The course in broncho-esophagology will be limited to twelve physicians and registration will be closed when this number has been registered. Applications for registration will be accepted in the order received.

The course will consist of didactic lectures, animal and cadaver demonstrations, practice in bronchoscopy, and esophagoscopy, diagnostic and surgical clinics, etc.

The tuition for the course is \$50; laboratory fee is \$50, making the total charge \$100, which should be remitted with application.

This course will be given under the personal direction of Dr. Paul Holinger.

For further information and schedule address: *Department of Otolaryngology, University of Illinois College of Medicine, 1853 West Polk Street, Chicago 12, Illinois.*

BOOKS RECEIVED:

Pulmonary Tuberculosis in the Adult—Its Fundamental Aspects by Max Pinner, M.D., from Chas. C. Thomas, Publisher.

The Pathogenesis of Tuberculosis by Arnold R. Rich, M.D., from Chas. C. Thomas, Publisher.

Courage and Devotion Beyond the Call of Duty from Mead Johnson & Co.

Pleuródese (Estudo Clinico, Experimental E Terapeutico) by J. M. Castello Branco, M.D. Introduction by Ugo Pinheiro Guimaraes, M.D., Brazil.

REPORTS RECEIVED:

Fortieth Report of the State Board of Health of Wisconsin by Carl N. Neupert, M.D., State Health Officer.

Twenty-Second Report of the Commission of Public Health (Victoria, Australia) from the State Director of Tuberculosis, Victoria.

Carbon Monoxide: Its Hazards and the Mechanism of Its Action—U. S. Public Health Service.

REPRINTS RECEIVED:

Posttraumatic Hemothorax Management—Lt. Comdr. Edw. M. Kent, and Lt. Harry E. Tebrock, (MC) USNR.

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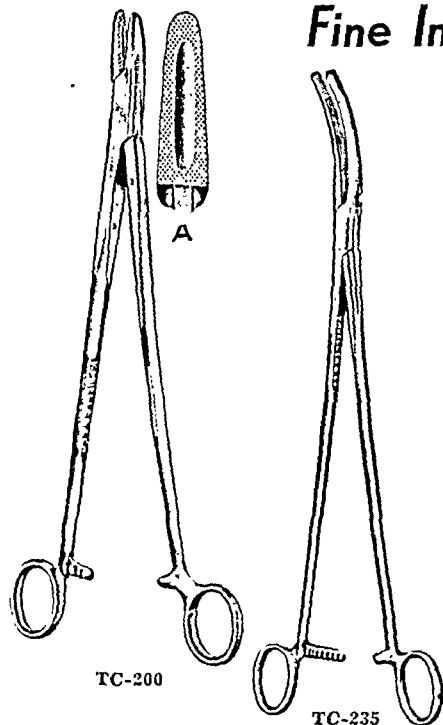
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Place list of references at end of article, not in footnotes. Arrange in numerical order.

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CONTENTS:

Symposium on Roentgenology

*To Commemorate the Fiftieth Anniversary of the Discovery
of the X-ray by Wilhelm Konrad Roentgen.*

INTRODUCTION	497
Andrew L. Banyai, M.D., F.C.C.P., F.A.C.P., Wauwatosa, Wisconsin	
THE ROENTGEN RAY: ITS PAST AND FUTURE	502
Russell H. Morgan, M.D., and Ira Lewis, M.D., Washington, D. C.	
THE SEGMENTS OF THE LUNGS—A Commentary on their Investigation and Morbid Radiology	511
A. F. Foster-Carter, D.M. (OXON), and Clifford Hoyle, M.D. (LOND.), F.R.C.P., London, England	
ROENTGEN TREATMENT FOR HODGKIN'S DISEASE AND LYMPHOSARCOMA OF THE CHEST	565
Arthur U. Desjardins, M.D., Rochester, Minnesota	
LENGTH AND WIDTH CHANGES IN THE PULMONARY ARTERIAL SYSTEM OF RABBITS IN PASSING FROM THE STAGE OF EXPIRATION TO THAT OF COLLAPSE AS REVEALED BY ROENTGENOGRAPHY	590
Charles C. Macklin, M.D., Ph.D., F.R.S.C., London, Ontario, Canada	
THE LATERAL PROJECTION OF THE CHEST	596
Samuel Brown, M.D., F.A.C.R., Cincinnati, Ohio	
CLINICAL VALUE OF ANGIOCARDIOGRAPHY	624
Henry K. Taylor, M.D., F.A.C.P., F.A.C.R., New York, New York	
THE BEARERS OF SHADOWS	639
Manoel de Abreu, M.D., Rio de Janeiro, Brazil	
NEUROGENIC TUMORS AT THE PULMONARY APEX	648
Lester W. Paul, M.D., Madison, Wisconsin	
INTRATHORACIC METALLIC FOREIGN BODIES	662
Commander L. Henry Garland (MC) USNR, Astoria, Oregon	
COMMENTS FROM OTHER COUNTRIES	678
OBITUARY (Dr. Ralph Charles Matson)	686
EDITORIAL—"Well Done"	689
COLLEGE NEWS	690
POSITIONS WANTED AND AVAILABLE	700
1945 AUTHOR INDEX	702
1945 SUBJECT INDEX	705

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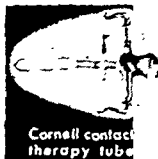
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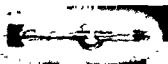
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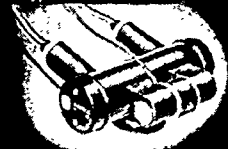
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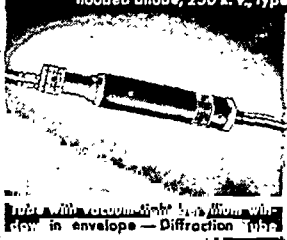
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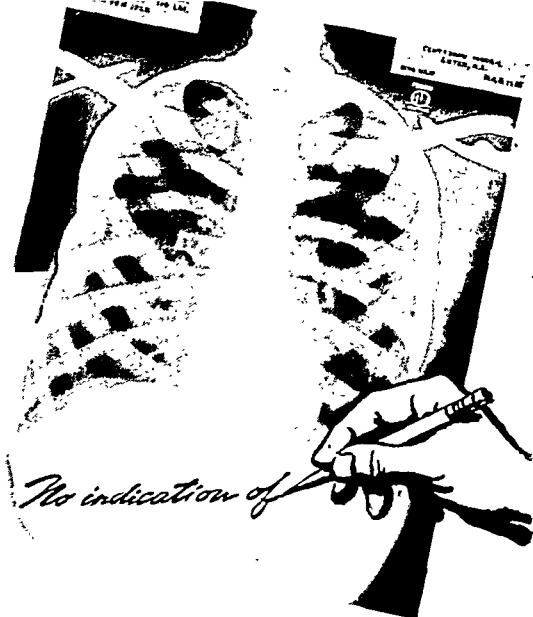
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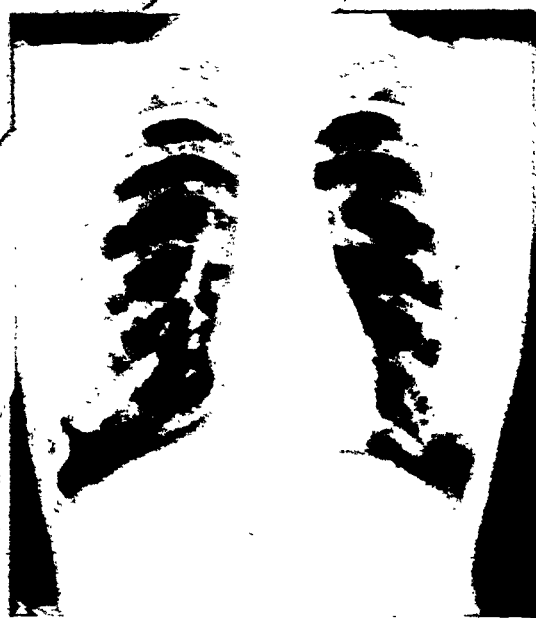
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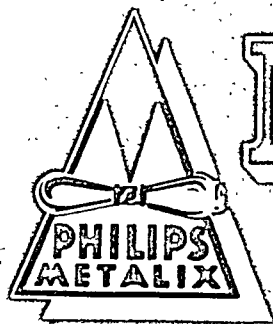
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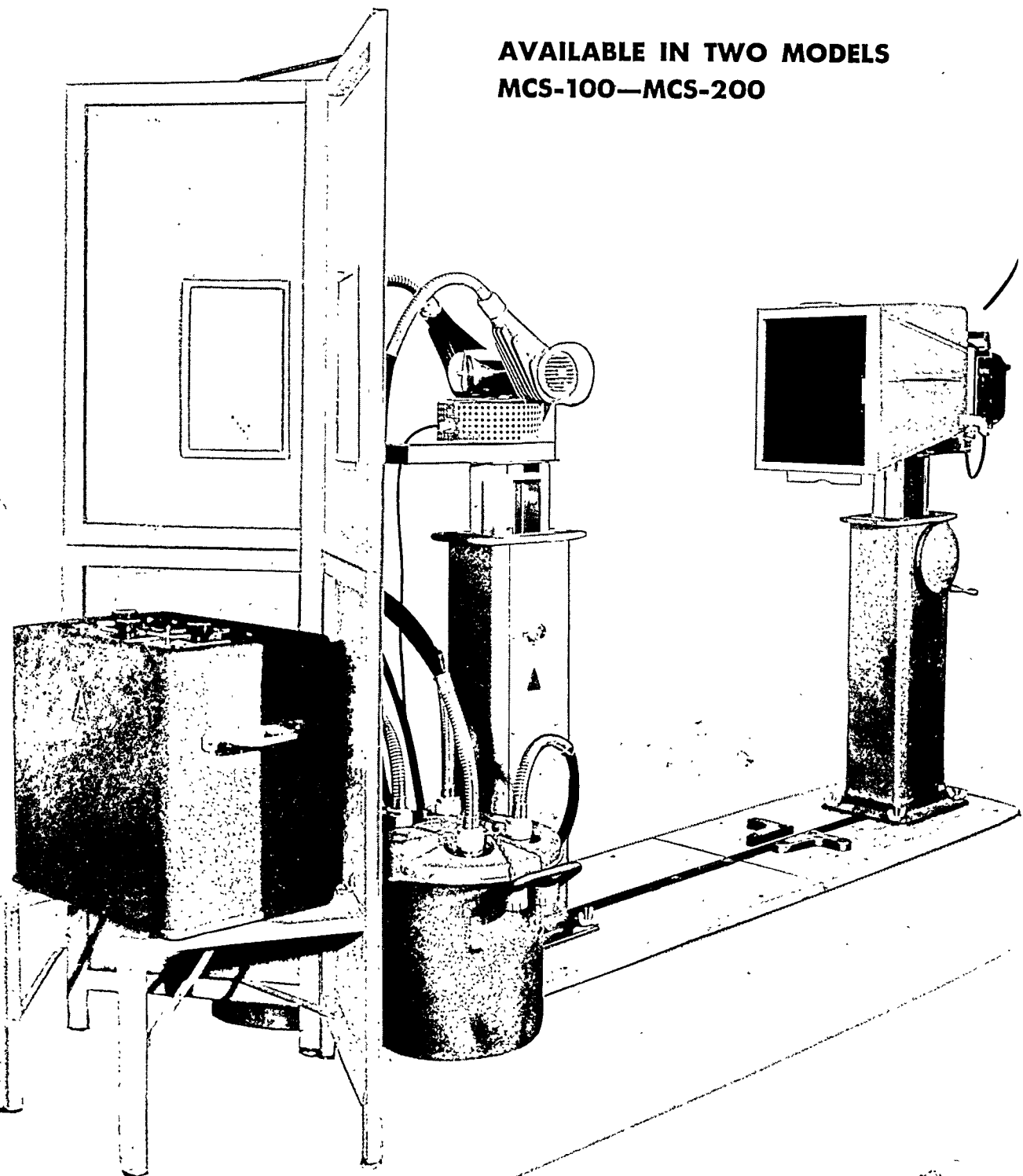
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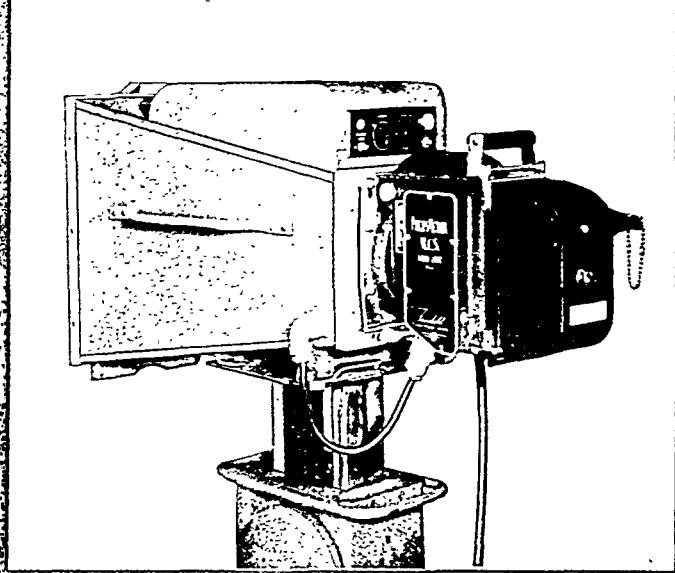
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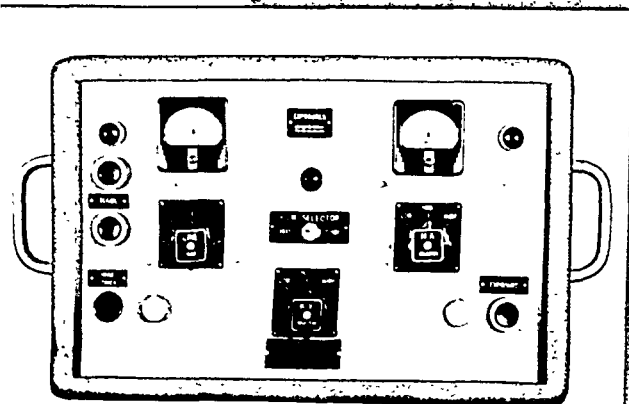
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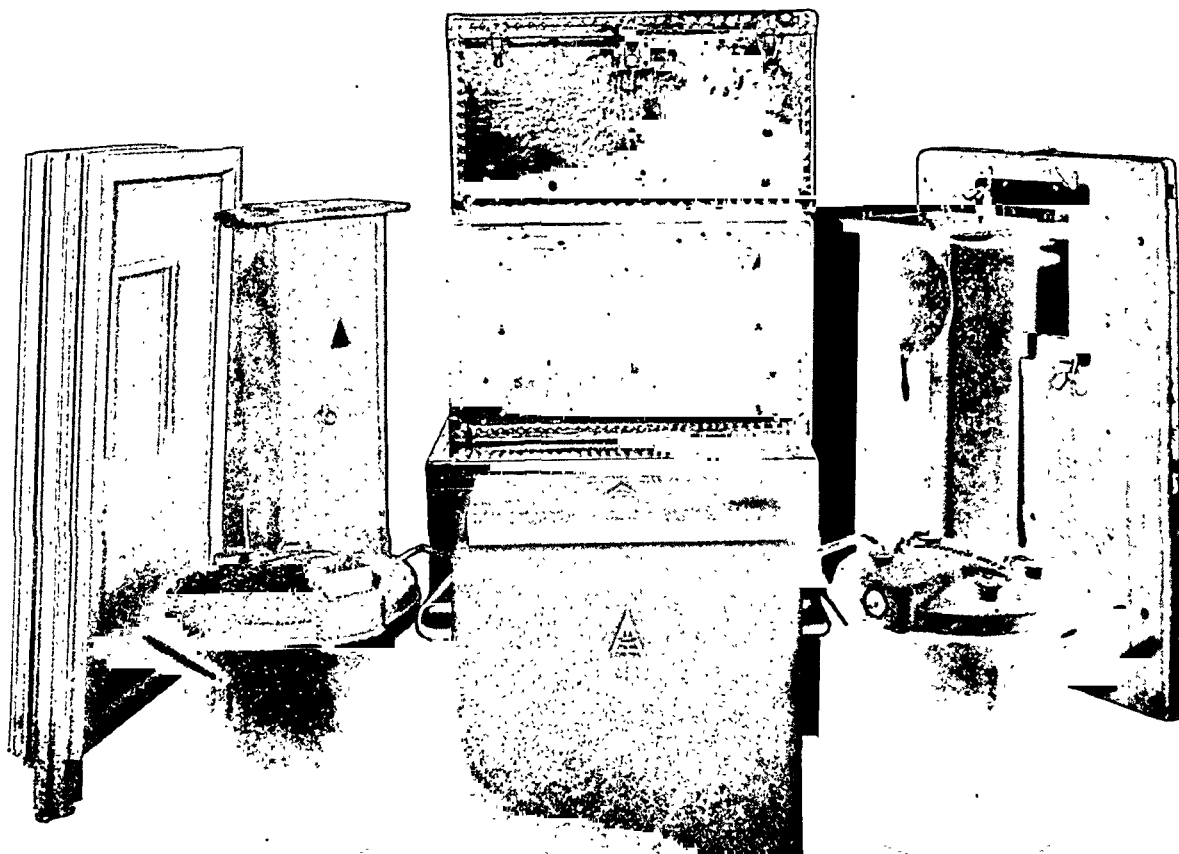
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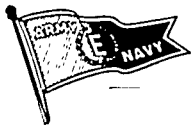
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1. Medical Clinics of North America, 1108, Sept. 1944.

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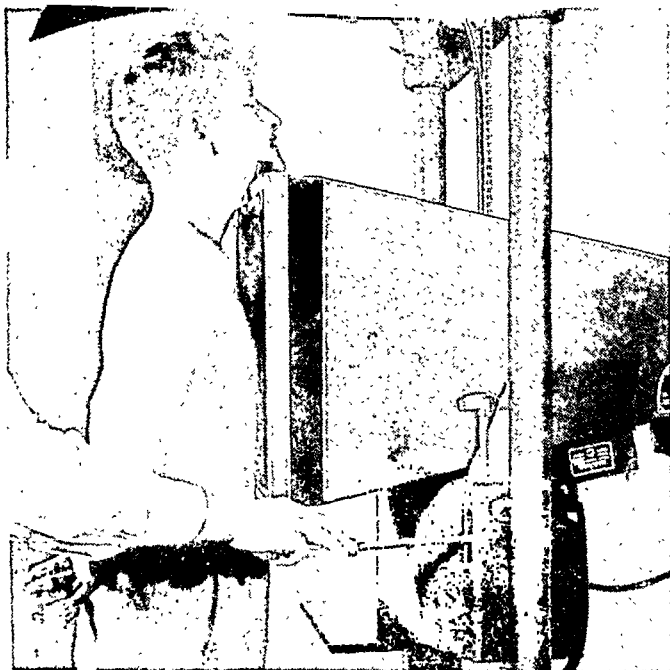
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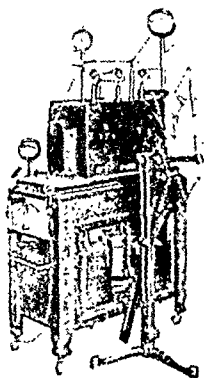
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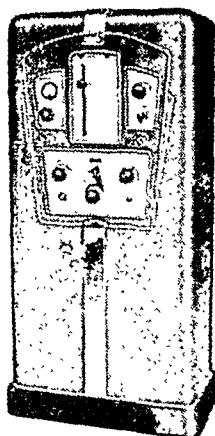


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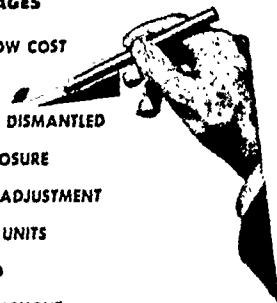
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DISEASES *of the* CHEST

VOLUME XI

NOVEMBER-DECEMBER, 1945

NUMBER 6

INTRODUCTION

ANDREW L. BANYAI, M.D., F.C.C.P., F.A.C.P.*

Wauwatosa, Wisconsin

The invisible rays discovered by Roentgen in 1895 are recorded on one of the most brilliant pages of the annals of medical history. This epoch-making discovery has maintained its radiant influence upon medical science ever since. The subsequent phenomenal developments in the field of roentgenology during the past half a century could not have been envisaged by the most daring mind of his age. The outstanding technical and scientific achievements in roentgenology are ably discussed in the contribution of Morgan and Lewis. As an adjunct to this, perhaps it may not be amiss to review some of the clinical aspects of roentgenology as related to diseases of the chest.

Roentgenological studies of recent years have vindicated the postulate of Parrot (1876), according to which a tuberculous involvement of the lymphnodes at the root of the lung is always an indication of a coexistent or foregone tuberculosis of the pulmonary parenchyma. At the same time, the validity of the concept of Behring (1912) that "phthisis is but the last verse of the song, the first verse of which was sung to the infant at its cradle," has lost much of its standing through combined investigations with the roentgen ray and the tuberculin skin test. By periodically repeated roentgenograms of the chest we have been able to follow the course of pulmonary tuberculosis from its inception to its complete healing by calcification. Further roentgenological studies confirmed earlier observations that lesions of the reinfection type of tuberculosis often heal by calcification. Extensive investigations conducted by the U. S. Public Health Service during the past few years brought to light the startling information that in a rather high percentage of cases calcified pulmonary nodules were not due to tuberculosis but rather to healed infection with *histoplasma capsulatum*. In passing, it may be recalled that pulmonary aspergillosis and coccidioidomycosis may heal also with pulmonary calcification. In this connection, reference should be made to

*From the Muirdale Sanatorium and from the Department of Medicine, Marquette University Medical School, Milwaukee, Wisconsin.

the roentgenological and pathological findings of Salinger (1932) which illustrated the occurrence of numerous nodular calcified areas in the lower lung fields in rheumatic mitral stenosis.

All those who are engaged in the diagnosis of diseases of the chest appreciate the valuable suggestions given in Brown's paper in this issue. There cannot be any question that positioning the patient during fluoroscopy and prior to taking roentgenograms may reveal findings which are not visible in the standard position. Another useful method of obtaining more accurate roentgenographic details of the lungs was proposed by Deutschmann (1934). By tilting the tube, 35 degrees up or down while it is focused on the apex, one is enabled to identify apical lesions which are not visible on the ordinary chest film. Roentgenograms taken with the patient in the lordotic position have also proved their usefulness for a more detailed visualization of the upper segments of the lung.

The comprehension and interpretation of pulmonary lesions localized to comparatively small anatomical segments of the lung, as presented in the work of Foster-Carter and Hoyle, is a gratifying revelation indeed. Undoubtedly, the time and effort sacrificed for the elucidation of this particular subject will be richly rewarded by the practical application of these observations in the diagnosis of pulmonary diseases as well as in their medical and surgical treatment.

The portrayal of the length and width changes of the vessels of the lesser circulation as presented by Macklin in this issue have an important bearing on the mechanism of the therapeutic action of the so-called conservative relaxation measures used in pulmonary tuberculosis. These studies enhance and clarify the angiopneumographic research of Carvalho (1940). It seems that there is a never-ending opportunity for the scientifically inclined inquisitive mind to discover new facts concerning the complex workings of the body in health and disease. We are reminded here of the remarkably instructive investigations of Hudson and Jarre (1929) and of Macklin (1925) which dealt with the changes in the size and shape of the bronchial tubes during respiration, and according to the concept of Macklin offered a rational explanation of the predilectional development of pulmonary tuberculosis in the so-called superior retroradical area. Subsequently, these observations were augmented by the contributions of Castex, Mazzei and Malenchini (1941). The results of their bronchocinematographic studies show that the normal bronchi have active respiratory movements which include, 1) changes in length and caliber, 2) peristalsis, 3) undulation, and 4) torsion.

A significant advancement in the field of roentgenology is re-

presented by the work of Hurtado and Fray (1933). They proposed to secure an accurate value of the true size of the chest cavity by a roentgenological method. Their assumption was that multiplying the area of the lung fields, measured in roentgenograms, by the antero-posterior diameter of the chest, measured externally—the so-called roentgenologic chest volume—would give a close approximation of the size of the thorax. They found that the correlation coefficient between the actual vital capacity and the roentgenological chest volume was higher than that between the vital capacity and body height, chest circumference, area of lung field, body surface area, and the chest volume based on external measurements, respectively. My own studies along these lines (1937) have convinced me of the reliability and usefulness of this method. The data of my protocols show that estimations of the vital capacity according to the formula of Hurtado and Fray were within ± 15 per cent of the actual vital capacity of the lungs in 97 per cent of 65 healthy individuals. As a by-product of the same investigation I noted that one could gain a reasonably close estimate of the respiratory functional capacity of a patient with silicosis or with silicosis and pulmonary tuberculosis by calculating the volume ratio of the lung: (roentgenological chest volume at maximum expiration divided by the roentgenological chest volume at maximum inspiration) times 100. With the exception of 2.5 per cent of the controls, the volume ratio was below 70 in forty healthy individuals, while in 60 per cent of the patients with pulmonary tuberculosis and silicosis, or silicosis alone the volume ratio was 70 or more.

An excellent exposition is presented in the article of Paul on neurogenic tumors at the pulmonary apex. Its differential diagnostic points deserve particular attention. This subject represents only a small fraction of neoplasms occurring in the lung and the mediastinum. There is incontrovertible evidence that the incidence of pulmonary cancer is on the increase. According to recent statistical reports, next to carcinoma of the stomach, pulmonary carcinoma is the most frequent carcinoma in the male. In its early developmental phases it may be entirely without manifest clinical symptoms. This being so, a great many patients reach the chest physician, the roentgenologist or the general practitioner when the carcinomatous process has already metastasized or encroached upon other vital organs and thus it has become inoperable. It seems to me, that it would be a highly desirable and justifiable project on the part of the medical profession to initiate and maintain a nationwide campaign for an annual roentgen examination of the chest (preferably by roentgenograms) of the entire adult population for the early detection of cancer.

Cardioangiography is one of the more recently popularized additions to diagnostic roentgenology. We are gratified by the presentation of this subject from the vast experience and with the critical evaluation of Taylor. The accompanying roentgenograms offer highly informative and didactic values. Roentgenography with the aid of contrast media has been of inestimable service in the diagnosis of pulmonary diseases. It is a matter of record that, in addition to its indispensable value in bronchiectasis, it may bring about direct or indirect evidence of bronchial stenosis, benign and malignant neoplasms, atelectasis, pulmonary abscess, congenital cystic disease of the lung, and others. Its usefulness for the visualization of bronchial ulcers was reported by Fariñas (1942) under the designation of bronchomucosography.

Garland's thoroughgoing study on intrathoracic metallic foreign bodies complements well the application of the roentgen ray in chest diseases as discussed by the other authors in this issue. In this connection, one may also proudly point to the diagnostic value of roentgenological examinations in nonopaque foreign bodies in the lung. The particular importance of films taken at the end of full inspiration and expiration must be kept in mind whenever such a diagnostic problem arises.

The presentation of de Abreu is of great interest because of its roentgenological and bacteriological aspects. Relative to the latter, since 1898 when Meunier first advocated the examination of the fasting gastric contents for tubercle bacilli, a number of publications brought confirmatory evidence of the usefulness of this diagnostic procedure. Therapeutic bronchial lavage was first suggested by Yankauer in 1914. The use of bronchial lavage for bacteriological examination, as described in de Abreu's article, is a significant contribution to the diagnosis of certain types of pulmonary tuberculosis.

The application of therapeutic roentgenology is well represented in this issue by the excellent analytical and critical review of Desjardin concerning the roentgen treatment of Hodgkin's disease and lymphosarcoma of the chest. There is a wide field of therapeutic roentgenology in chest diseases. There are items which are of no more than historical interest, such as roentgen irradiation of the lungs for pulmonary tuberculosis. On the other hand, the same method is still being used in the treatment of certain types of bronchiectasis. The use of roentgen therapy for bronchiectasis rests on the observation that irradiation of the salivary glands is followed by a substantial reduction in or a practically complete abolition of their secretory function. On the basis of analogy, it was thought that exposure of the lungs to roentgen rays may bring about a decrease in the secretion of the glands

of the bronchial mucosa. Also, it has been reasoned that roentgen therapy is beneficial because it may bring about a clearing of chronic inflammatory processes in the lung. It is generally accepted that no corrective morphological response can be expected from this treatment as far as bronchiectatic deformities are concerned. The greatest accomplishment of this measure lies in changing a "wet" bronchiectasis, with excessive cough and massive expectoration into a "dry" bronchiectasis, with markedly reduced cough and with virtual disappearance of expectoration. Two points are worthy of remembering in this connection: 1) An exacerbation of the symptoms can be anticipated during treatment. 2) Complete therapeutic benefits of the treatment may not become manifest in less than four months after the conclusion of the therapy.

No attempt has been made in this review to cover the entire field of roentgenology. It is beyond the scope and technical feasibility of this presentation. It has been my intention to focus attention on some of the highlights of this branch of medicine in harmony with the current articles of the contributors.

This commemorative issue of *Diseases of the Chest* is being published on the occasion of the one-hundredth anniversary of the birth of Roentgen and of the fiftieth anniversary of the discovery of the roentgen ray. It is being offered as a symbol of the respect, homage and tribute which all of us wish to pay to the genius of Roentgen. The joint presentation of contributions from various parts of the United States, from Canada, Great Britain, Brazil and other countries is a solid expression of the unity of scientific thought and endeavor. May this harmony and understanding bring about a closer cooperation among those who dedicate their professional efforts to the diagnosis and treatment of chest diseases so that we may anticipate still further progress and still greater achievements in this field of medical science.

The Roentgen Ray: Its Past and Future**

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Few events have had a more profound influence on the practice of medicine than the discovery of the roentgen ray, the fiftieth anniversary of which we are celebrating this year. Almost from the day that Roentgen made his dramatic announcement to the world, physicians and physicists everywhere began work on the development of equipment to utilize this new radiation in the diagnostic and therapeutic fields of medicine.

The events which culminated in Roentgen's discovery on November 8, 1895, extend back to the Golden Age of Greece when observations were made of "electric" phenomena. However, from this time until the 17th Century this knowledge lay buried and it was only in 1600, when Gilbert¹ in England began the performance of a long and brilliant series of experiments, that the science of electricity was placed upon a firm foundation. Shortly thereafter, von Guericke began the study of electrical conduction through gases. These researches were continued through the 18th Century by Hawksbee, Dufay, Nollet, and Morgan. The equipment used in the experiments of two of these workers, Hawksbee and Morgan, had the potentiality of producing roentgen rays; indeed, in 1785, Morgan, it is generally assumed, produced such radiation, although its existence was unknown to him. During the 19th Century, the work of Faraday, Maxwell, Hertz, Hittorf, Crookes, and Lenard, to mention only a few, added still further to the knowledge of electrical conduction through gases. It was this research which prompted Roentgen² to begin his experiments (Figs. 1 and 2).

It is difficult to say whether Roentgen's discovery of the radiation which now bears his name and which he originally referred to as "X-rays," was the result of deliberate research or of mere chance. There is, however, abundant evidence that his findings were anticipated. It is known, for instance, that his final experiments were conducted in total darkness with a Crookes' tube that was covered with black cardboard to prevent the escape of visible light produced by the gaseous discharge within the tube. Furthermore, there was also present near the tube a small piece of cardboard impregnated with barium platino-cyanide which would only fluoresce when impinged upon by the radiation of wave lengths

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shorter than those to which the eye is sensitive. On the other hand, those who believe that the discovery was one of chance base their opinion on the fact that in the years following 1900, Roentgen made no significant contributions to the rapidly developing field of radiology.

The Crookes' tube, shown schematically in Figure 3, with which Roentgen performed his experiments, consisted of a glass envelope in which were sealed two metallic electrodes. The tube was evacuated to a low pressure (a fraction of a millimeter of mercury) and by means of an induction coil a high potential was impressed upon the electrodes. The small quantity of gas which remained



Figure 1



Figure 2

Fig. 1: Plaque commemorating Roentgen's discovery installed on outside of the scientist's laboratory in Wurzburg, Germany. Inscription reads: "In this building there were discovered by W. C. Roentgen in the year 1895 the rays that have been named for him".—Fig. 2: Wilhelm Konrad Roentgen, 1845-1923.

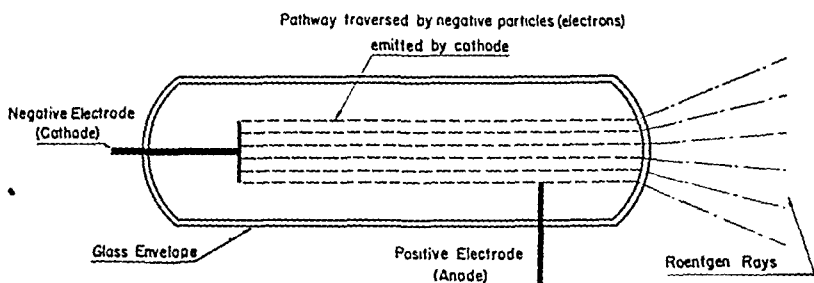


Fig. 3: Schematic diagram of Crookes' tube with which Roentgen was experimenting when he first detected the radiation which now bears his name.

within the tube was immediately ionized and this condition caused the ejection from the negative electrode of a stream of charged particles (electrons) which traveled in the direction of the positive electrode. Their momentum, however, carried them past this structure, and they impinged upon the glass end of the tube. The pathway along which these particles traveled is shown in dotted outline in Figure 3. The interaction of the electrons and the atoms comprising the glass wall of the tube produced the penetrating radiation which Roentgen detected by means of the barium platino-cyanide screen.

In the half-century that has elapsed since 1895, the roentgen ray has found wide application in the fields of medicine and industry. This has been made possible by the refinement and progressive development of the original apparatus. First, in the early 1900's the rather unsatisfactory induction coil was replaced by the high-tension alternating current transformer. Soon after, rectification systems were added to permit the utilization of both phases of the alternating current wave. Lemp in 1897, Koch in 1904, and Snook in 1907³ developed the once-popular motor-driven mechanical rectifier. Later on, Caldwell in 1910 and Dushman in 1915³ perfected a valve tube rectifier which provided increased stability and noise-free operation of the roentgen ray unit (Figs. 4 and 5).

The early roentgen ray tubes were modifications of the Crookes' tube. They were characteristically erratic in performance, however, and it was, therefore, impossible to realize their full potentialities. This difficulty was brilliantly overcome in 1913 when Coolidge⁴ perfected the hot-cathode roentgen tube. Until this time, the principal refinement in roentgen tube design was the electrostatic

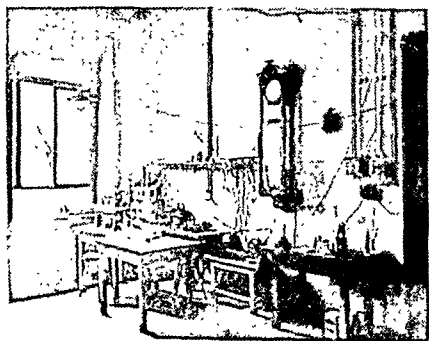


Figure 4



Figure 5

Fig. 4: Roentgen's laboratory. This photograph was made in 1923. The benches, the clock, and much of the apparatus that may be seen are as they were in Roentgen's days. The electric light and the power lines are modern additions.
Fig. 5: Collection of coils, screens, tubes and targets said to have been used by Roentgen.

focusing of the stream of particles (electrons) emitted from the tube's negative electrode on a tungsten target rather than on the glass walls of the tube. However, little control could be exercised over the intensity of this electron stream and, as a result, tube performance was exceedingly unreliable. The replacement of the cold cathode by a heated filament and the total evacuation of the tube permitted the establishment of full control over the cathode ray stream. In a completely evacuated tube equipped with a heated filamentary cathode, the cathode ray stream is composed of electrons "boiled" from the filament's surface. The intensity of the stream is dependent on the temperature of the filament and, accordingly, regulation of the cathode ray stream may be obtained by controlling the heat of the filament.

Since 1913 the principal roentgen tube developments are the shock-proof tube, the ray-proof tube, and the rotating anode tube. The first two developments have added greatly to the safe operation of roentgen apparatus. The third has improved the clarity of roentgenographic films by permitting the tube to be operated at high energies and with small target areas. Image unsharpness, formerly caused by long exposure times and large target areas, was thereafter greatly reduced.

From the inception of the roentgen ray both fluoroscopy and roentgenography were used to record roentgen images. In the former, screens of the barium platino-cyanide type were used but were soon found to be unstable and were replaced by calcium tungstate and zinc sulfide screens. Later, cadmium tungstate and zinc cadmium sulfide screens replaced the older materials.

In the early days, roentgenography was performed with standard photographic plates, a method which proved extremely inefficient. A considerable improvement was achieved soon after the beginning of the 20th century when the practice of exposing these plates with single fluorescent screens was introduced. Photographic emulsions in general are relatively insensitive when exposed to roentgen rays directly but their sensitivity may be markedly increased by exposing them to fluorescent light which has been incited by roentgen radiation.

Photographic plates were replaced by the more convenient roentgenographic film soon after the opening of the first World War, a change made mandatory by the critical supply problems of the Army. In 1919 the practice of coating both sides of the film with a photo-sensitive emulsion was begun. This was followed in the next year by the introduction of double-type intensifying screens with which both layers of the roentgenographic film receive exposure. By this means the sensitivity of the film was greatly increased. Until 1929 roentgenographic film was normally

supplied with the emulsion coated on a nitrate base. After the disastrous fire which occurred at the Cleveland Clinic, in that year, the non-inflammable cellulose acetate base was adopted universally (Figs. 6 and 7).

Through the years there have been many additional technical developments which have contributed to the use of the roentgen ray as a diagnostic medium. Of these, the Potter-Bucky⁵ diaphragm is probably the most important. This device, a relatively simple mechanism which consists of alternate laminations of lead foil and wooden strips, effectively eliminates the major quantity of the scattered radiation which otherwise would reach the roentgenographic film. The removal of this scattered radiation is extremely important, because its presence fogs the roentgenographic film and markedly reduces its clarity. Another technical development which has enjoyed wide use is stereo-roentgenography by means of which three dimensional perception of the anatomical structure under examination is possible. A third development is planigraphy or body section radiography which first was described by Bocage⁶ in 1921. This technique, however was not perfected until 1930, when it became a valuable diagnostic adjunct. Kymography, a technique by which various physiological motions may be recorded on the roentgenographic film, was introduced first

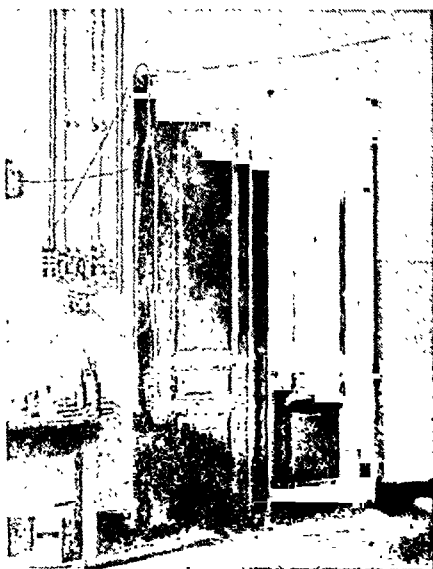


Figure 6



Figure 7

Fig. 6: Wooden doors between Roentgen's laboratory and an adjacent room through which Roentgen made one of his earliest plates. He found that the wood was transparent and that there were linear streaks which he identified as the shadows of white lead that had been used in setting the panels in the door frame.—*Fig. 7:* Desk used by Roentgen in his laboratory.

in 1911.⁷ It was not until after 1928, however, that this procedure received widespread attention, and its use in the study of cardiac motion was delineated. The recently announced electrokymograph,⁸ a photoelectric roentgen device by which physiological motion is recorded much more clearly than in previous kymographic procedures, will undoubtedly extend the usefulness of the method still further.

At an early date it was recognized that the roentgen ray characteristics of most anatomic tissues were such that they could not be visualized without the use of contrast media. In the case of the chest the accidental introduction of bismuth paste into the bronchial tree during gastro-intestinal examinations was the first instance in which a contrast medium was employed. This was soon followed by the deliberate installation of other bismuth compounds and then the less noxious iodized oil preparations.

Of considerable interest to the chest physician has been the development of photofluorography. This procedure, in which a fluorescent image of the chest is photographed on film of reduced size, was first developed by Bleyer in 1897.⁹ The method, however, did not become practical until the early 1930's when it became widely used as a tuberculosis case-finding medium.

One of the most recent technical developments is the automatic photo-electric timing mechanism—the phototimer. The purpose of this device is to produce uniformity in the quality of roentgenographic films. It was first used in 1941¹⁰ to control the exposure of gastro-intestinal roentgenograms. It has since earned a valuable place in mass radiography, and is at the present time being developed for use in general roentgenography.

In the foregoing paragraphs the discussion has been centered solely on the diagnostic applications of the roentgen ray. Developments in the field of therapeutic radiology, however, have followed along fundamentally similar lines, although the emphasis has been on the use of a much wider range of kilovoltages. It has been hoped to discover by this method a roentgen tube potential which will produce radiation having a specific lethal effect on neoplastic tissues. At the present time roentgen generators ranging in potential from 50 KVP to 1000 KVP are commercially available. Experimental generators (the betatron¹¹) which have capacities up to 100,000 KVP have been produced. Indeed, a betatron having a capacity of 200,000 KVP and producing a roentgen beam of extremely high intensity (approximately 10 r at a distance of one or two kilometers) is said to have been contemplated by German scientists before the defeat of their nation. This instrument was to have been used, however, as a lethal military weapon rather than as a therapeutic device.

This leads us to speculate upon the course which further developments will take in the field of radiology. Almost certainly this course will be dictated by our needs, some of which already are clearly apparent. Mass radiography, for example, might be greatly facilitated if there were available a small compact roentgen generator weighing not more than 100 pounds that could be operated from domestic 110-volt power sources. Experiments which will lead, in the not too distant future, to the development of such a generator are in progress at the present time. The success of this research is dependent on accompanying developments in high tension cable design, on improvements in the speed of films and screens and on the simplification of roentgen machine controls. These developments will be applicable to a large number of other roentgenographic problems. At the present time the trend is toward the use of higher kilovoltages in roentgenography, but if potentials of 100 KVP are to be exceeded, present day cables sufficiently strong to withstand these voltages would be too bulky. There is reason to believe that before long relatively small cables able to withstand anticipated kilovoltages will be developed. They will be made possible by the use of new materials and new methods of fabrication.

In recent years there has been a tendency to simplify the operating controls of roentgen machines. Although not a great deal has been accomplished in this direction, it appears likely that with the further development of automatic exposure devices, single dial control panels are entirely feasible. With this one dial the technician would automatically select the proper kilovoltage, milliamperage, and exposure time for the anatomical structure under examination; indeed, it is conceivable that the dial might be labeled in terms of the part to be roentgenographed, such as chest, knee, skull, etc., rather than in numerical values of kilovoltage, milliamperage, exposure time, etc.

The value of roentgen cinematography has long been recognized. The procedure however, has not been feasible because present-day films and screens do not possess adequate speed and because present-day roentgen generators lack the efficiency needed for this operation. This situation may be expected to stimulate the development of faster screens and films. Furthermore, it probably will result in the production of roentgen-generating systems that utilize kilovoltages appreciably higher than those now in use in diagnostic roentgenographic equipment since the efficiency of generating systems rises sharply with increase in kilovoltage.

Considerable research will also be devoted to the development of entirely new roentgenologic methods. One of these, from which

almost unlimited possibilities may be foreseen, is fluoroscopy to which has been added a system of amplification.¹² From the earliest days of roentgenology, fluoroscopy has remained at a stage analagous to that occupied by the crystal set in radio. The usefulness of this method has been seriously limited by the low visual acuity which an observer possesses when working at the low levels of illumination obtainable under existing fluoroscopic conditions. Accordingly, most roentgen procedures are conducted with roentgenography, even though this process introduces many technical and clinical disadvantages.

The limitations of fluoroscopy would be effectively overcome if fluorescent images could be amplified several thousand times. Then the illumination of the screen might be expected to approach the brightness of the usual roentgenographic view box. Visual acuity would be markedly increased and pathological processes could be visualized in multiple projections with the same clarity as that provided by a roentgenographic film. Furthermore, dark adaptation of the operator would no longer be required; indeed, examinations could be conducted in normally lighted rooms such as practitioners' offices, surgical amphitheatres, etc. The use of sufficient amplification would also allow considerable reduction in the intensity of the exposing radiation. Radiation hazards would be thereby largely eliminated. With fluorescent amplification, all roentgenographic procedures, including mass radiography, roentgen cinematography, kymography, etc., would be enormously simplified. If roentgenograms should be desired after a fluoroscopic examination, they could be secured by photographing the fluorescent screen. Thus powerful roentgen equipment would almost never be required, and the cost of the average installation would be markedly reduced.

Several means whereby fluorescent amplification may be accomplished have been proposed. One suggests the use of television methods; another the use of electron optics. At the present time the first of these appears to be entirely impracticable; the second, however, has very real potentialities and, doubtless, within the next few years a great many investigators will be engaged busily in exploring its possibilities.

How many of the foregoing speculations will achieve realization it is impossible to say. However, it will be interesting to follow the many developments which are almost certain to occur within the next few years. Until the present time roentgenology has constituted one of the most dynamic of the medical sciences. There is little reason to believe that it will ever be other than progressive and fruitful of significant achievements.

Acknowledgement

The original photographs reproduced in this paper are from the collection of Dr. Paul C. Hodges, Division of Roentgenology, the University of Chicago.

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The Segments of The Lungs

A Commentary on their Investigation and Morbid Radiology

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CONTENTS

HISTORICAL INTRODUCTION.

METHODS OF INVESTIGATION.

THE RADIOLOGICAL FEATURES OF SEGMENTAL LESIONS.

Right Upper Lobe:

- (1) Right Anterolateral Segment.
- (2) Right Posterolateral Segment.
- (3) Right Apical Segment.

Minor Subdivisions of the Right Upper Lobe Segments.

Right Middle Lobe:

- (1) Right Anterior Middle Segment.
- (2) Right Lateral Middle Segment.

Minor Subdivisions of the Right Middle Lobe Segments.

Left Upper Lobe:

A. Left Upper Lobe Proper:

- (1) Left Anterolateral Segment.
- (2) Left Apicoposterior Segment.

B. The Lingula or Lingual Process:

- (3) Left Anterior Middle Segment.
- (4) Left Lateral Middle Segment.

Minor Subdivisions of the Left Upper Lobe Segments.

The Lower Lobes:

- (1) Dorsal Segment.
- (2) Posterior Basic Segment.
- (3) Anterior Basic Segment.
- (4) Middle Basic Segment.
- (5) Right Cardiac Segment.

Minor Subdivisions of the Lower Lobe Segments.

THE APPLICATIONS OF SEGMENTAL ANATOMY.

SUMMARY.

*From the Brompton Hospital, London.

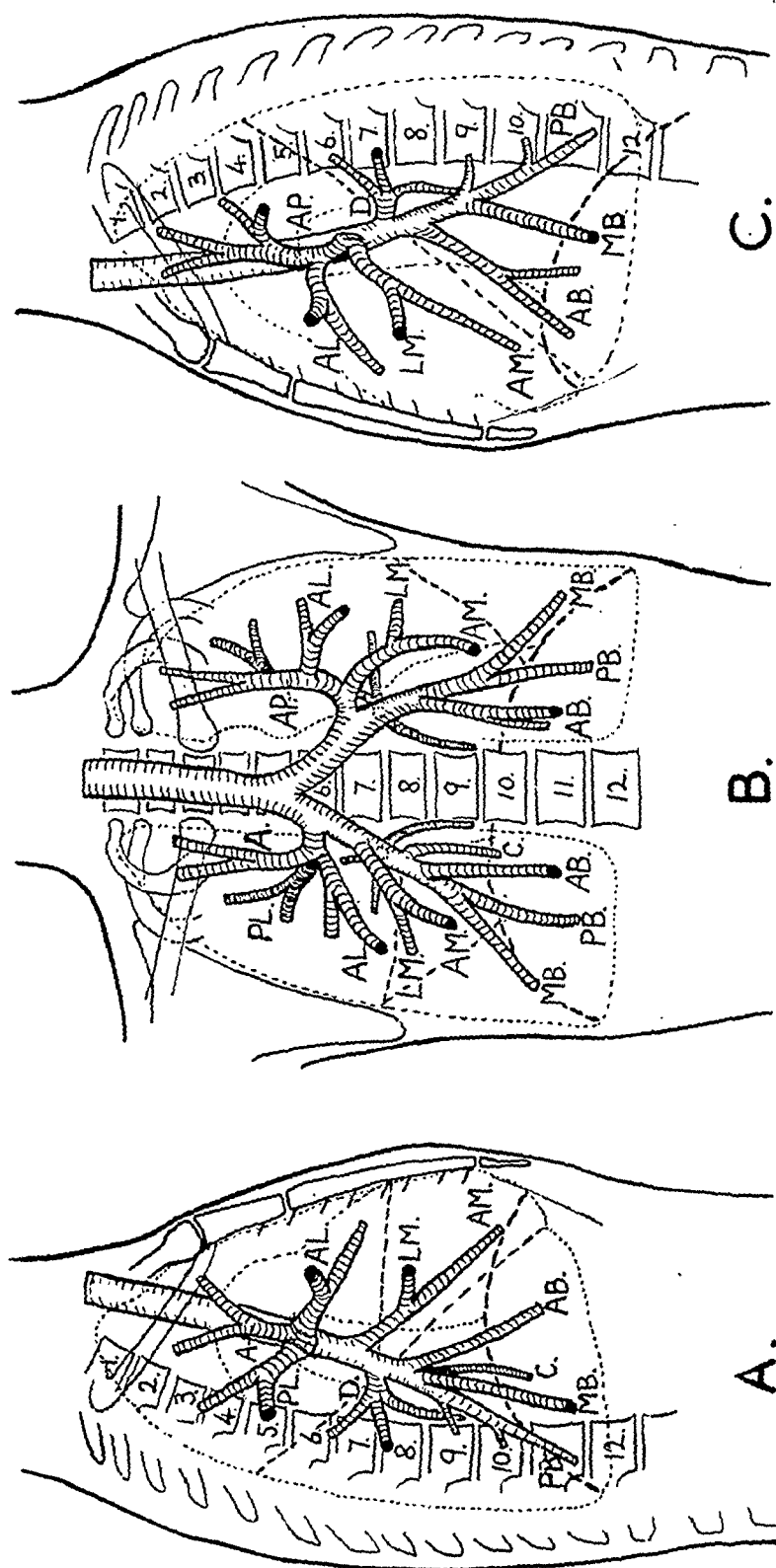


Fig. 1: The Bronchial Tree. (A): Right lateral view. (B): Anterior view. (C): Left lateral view.—A, Apical. AL, Anterolateral. PL, Posterolateral. LM, Lateral middle. AM, Anterior middle. D, Dorsal. PB, Posterior basic. MB, Middle basic. AB, Anterior basic. C, Cardiac.

HISTORICAL INTRODUCTION

It has been known for many years that each branch of the bronchial tree aerates a separate wedge of lung tissue. In 1889, William Ewart,¹ who was physician and pathologist at the Brompton Hospital, wrote of large groups of lobules in each lung, isolated from one another as regards their air supply and forming separate respiratory districts. Thus the credit must go to Ewart for being one of the first to describe the units which we now call broncho-pulmonary segments. This remarkable anatomist was far ahead of his age, but his descriptions of the structure of the bronchi and lungs were largely forgotten until recently, although both his methods of investigation and his discoveries have stood the test of time.

In 1932, Kramer and Glass² defined a broncho-pulmonary segment as an area of lung supplied by a constantly placed bronchus, having an orifice situated in a large lobar bronchus and visible to the bronchoscopist. Since then, other accounts of the bronchi and broncho-pulmonary segments have been published (Nelson,³ Lucien and Weber,⁴ Neil, Gilmour and Gwynne,⁵ Behr and Hui-zinga,⁶ Pierce and Stocking,⁷ Adams and Davenport,⁸ Foster-Carter,^{9,10,11} Brock¹²), illustrated with diagrams showing the position of the segments on the surface of the lungs. At first sight these maps look very different, but this is largely because there has been no general agreement upon the bronchi selected for description. Some authors have confined themselves to charting areas supplied by large and relatively constant bronchi, while

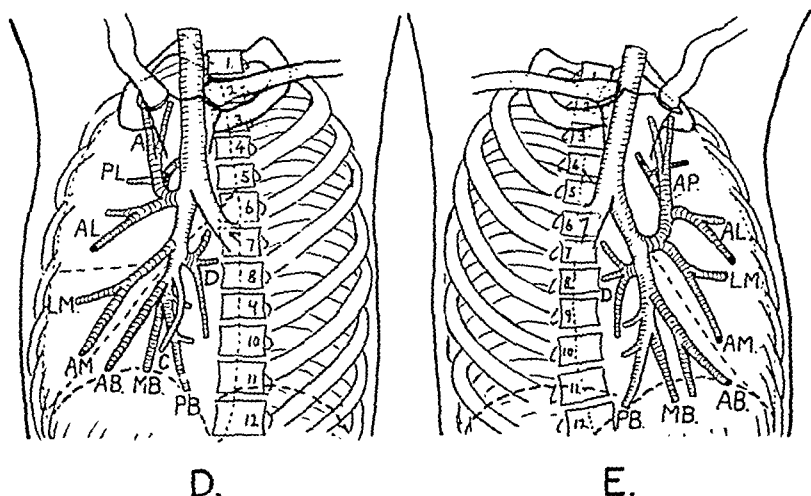


Fig. 1: The Bronchial Tree. (D): Left anterior oblique view. (E): Right anterior oblique view.—A, Apical, AL, Anterolateral, PL, Posterolateral, LM, Lateral middle, AM, Anterior middle, D, Dorsal, PB, Posterior basic, MB, Middle basic, AB, Anterior basic, C, Cardiac.

others have attempted to map out the segments served by smaller branches. The portrayal of broncho-pulmonary segments is thus bound to be arbitrary, for it is conditioned by the bronchi selected. Either a whole lobe or a terminal lobule may be regarded as a broncho-pulmonary segment, depending upon whether a lobar bronchus or a terminal bronchiole is the unit. But, allowing for some minor faults, all previous accounts really depict a common bronchial pattern (Fig. 1).

It therefore seems to us expedient to define a broncho-pulmonary segment as the portion of lung served by a principal branch of a lobar bronchus, and this branch may then be called a segmental bronchus. Such branches are large and relatively constant, and they are familiar already to those who have a knowledge of bronchial anatomy. Although there can be variety in the shape and size of the segments in different subjects, there is a characteristic pattern, which is common to all (Fig. 2). In this pattern, based upon the segmental bronchi as we have defined them, each lobe is divided conveniently into a few major districts. The smaller bronchi are less constant in their relative size and mode of branching than the larger ones and variations are more common, so that individual accounts of these subsegments will differ considerably. Further subdivision has a limited application to special problems, such as the localization of a lung abscess, but for gen-

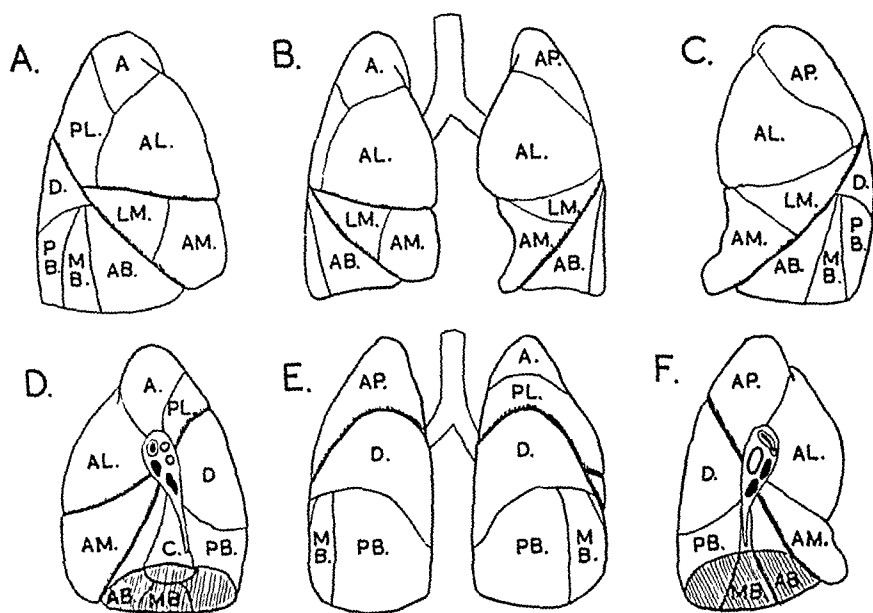


Fig. 2: The Broncho-Pulmonary Segments. (A): Right lung, lateral view. (B): Both lungs, anterior view. (C): Left lung, lateral view. (D): Right lung, medial view. (E): Both lungs, posterior view. (F): Left lung, medial view.—A, Apical. AL, Anterolateral. PL, Posterolateral. LM, Lateral middle. AM, Anterior middle. D, Dorsal. PB, Posterior basic. MB, Middle basic. AB, Anterior basic. C, Cardiac.

eral use it is confusing and we believe unprofitable. A point is soon reached when the branches hide the tree.

The objects of this paper are threefold; to describe the methods whereby the radiological anatomy of broncho-pulmonary segments has been investigated; to give an account of the broncho-pulmonary segments with special reference to the radiological features of segmental lesions; and to discuss the application of this knowledge to medical problems.

METHODS OF INVESTIGATION

The Anatomy of Normal Segments:

The respiratory districts of the lung may be studied in various ways. The anatomy of the bronchi themselves must first be learned from casts, dissections and bronchograms, and Figure 1 represents the most common arrangement of the more important bronchi (Foster-Carter^{9,10,11}). The topography of the bronchial distribution may be learned both from the study of excised lungs and from radiographs of the living. The study of bronchial casts (Fig. 3) gives a rough idea of the distribution of the segmental bronchi, but the exact surface limits of an individual segment can be

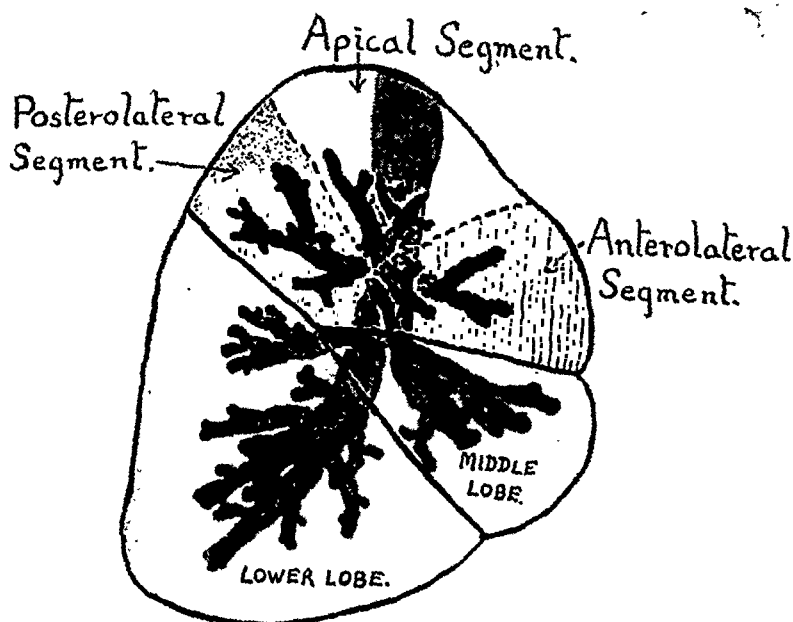


Fig. 3: Celloidin Cast of Right Bronchial Tree of 180 mm. Human Embryo; lateral view. Approximate positions of the lung and upper lobe segments have been outlined.

shown by distending it with air through its bronchus (Fig. 5a). This method of inflation is of great antiquity; it was used by Leonardo da Vinci (Hopstock¹³) and other ancient anatomists investigating the structure of the lungs. Celloidin, gelatin, paraffin wax and radio-opaque materials have been used in the same way to make more permanent preparations. The most complete picture of both the external and internal configuration of a broncho-pulmonary segment is obtained by injecting it with gelatin or wax and then making serial slices through the lung, from which the segment may be reconstructed (Fig. 5b).

The Anatomy of Segmental Lesions:

When the normal anatomy of the broncho-pulmonary segments has been determined by these methods, it becomes clear that many pulmonary opacities seen in radiographs of patients conform in shape, size and position to broncho-pulmonary segments. Further evidence that such opacities are segmental is sometimes provided by finding a lesion in the segmental bronchus. Additional proof of the segmental nature of these radiological shadows was sought from scale models of the lungs, constructed in plasticene. These were divided into lobes and segments. The positions of the lobar and inter-segmental boundaries were determined by taking the average or most common arrangement found in the anatomical studies (Figs. 2 and 4). Plasticene is a substance which, like consolidated lung, is only partially opaque to x-rays; and consequently

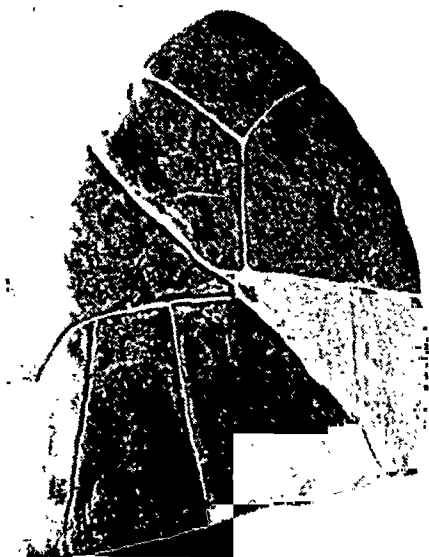


Fig. 4: Plasticene Model of Right Lung; lateral view.

a radiograph of an irregular piece of plasticene shows a variation in density proportionate to the thickness of the mass in the path of the rays. The next step was to place each plasticene segment in the position which it would normally occupy in the body and to take both postero-anterior and lateral radiographs of it. As



Figure 5a



Figure 5b

Anterolateral Segment of Right Upper Lobe. *Fig. 5a*: Right lung, anterolateral segment inflated with air; A, greater fissure, B, lesser fissure.—*Fig. 5b*: Horizontal section through right upper lobe, from above; segments injected with coloured gelatin; anterolateral, light, posterolateral, dark.



Figure 5c



Figure 5d

Anterolateral Segment of Right Upper Lobe. *Fig. 5c*: Plasticene model of anterolateral segment, anterior view.—*Fig. 5d*: Lateral view of same model.

these represented the radiological appearance of a solid copy of this area of the lung, a consolidation of the corresponding segment in the living subject would be expected to cast a similar shadow. In every case the radiographic shadows of the model segments proved to be closely similar to those which were thought to be segmental consolidations in the lungs of living subjects.

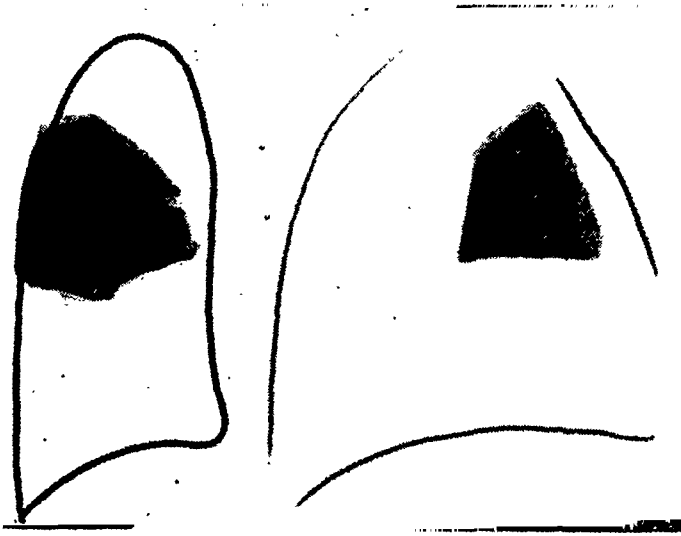


Figure 5e

Figure 5f

Anterolateral Segment of Right Upper Lobe. *Fig. 5e*: Radiograph of C.—*Fig. 5f*: Radiograph of D.

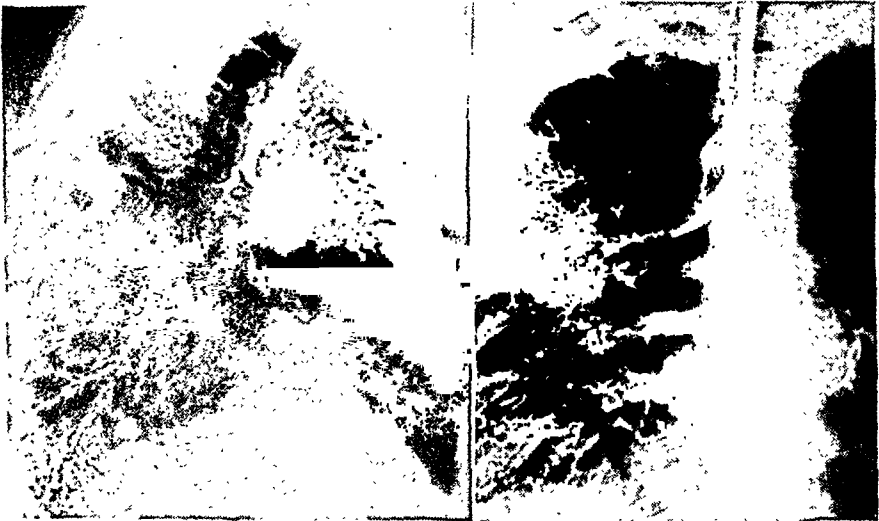


Figure 5g

Figure 5h

Anterolateral Segment of Right Upper Lobe. *Fig. 5g*: Postero-anterior radiograph of patient showing anterolateral segment outlined with iodised oil.—*Fig. 5h*: Lateral radiograph of same patient.

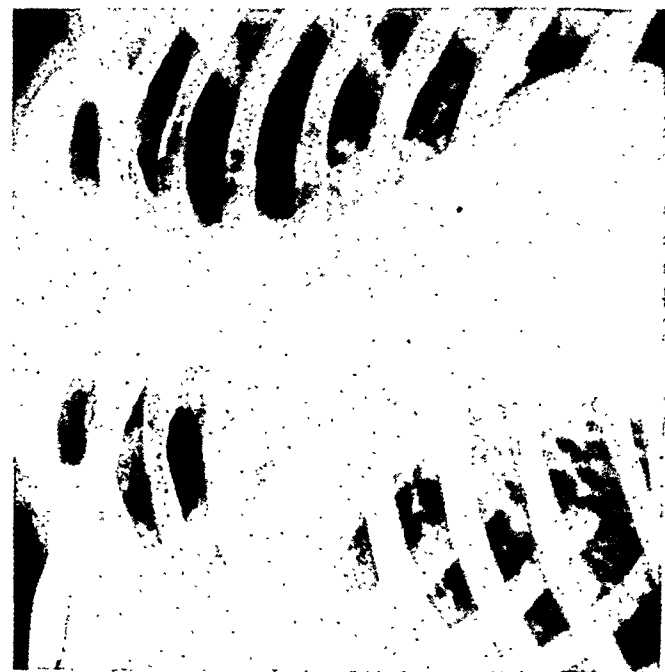


Figure 5i

Anterolateral Segment of Right Upper Lobe. Postero-anterior radiograph showing consolidation of anterolateral segment due to a lung abscess; confirmed by bronchography. Raising of fissure indicates some associated collapse.



Figure 5j

Anterolateral Segment of Right Upper Lobe. Lateral radiograph of same patient.

The variations in density within the consolidated segments due to their shape, matched those seen in the radiographs of the models (Figs. 5a to 5j).

Pathological material often provides proof of the anatomical and functional independence of the broncho-pulmonary segments in the human lung. A segment may be outlined by infection or collapse in sharp distinction to its relatively normal neighbors (Figs. 6a, 6b and 6c). When infection is present, the fibrous septa between the segments are often thickened and can be seen in microscopic preparations (Fig. 6d) or even with the naked eye (Fig. 6c). These septa are formed by the inter-lobular septa described by Miller.¹⁴ They rarely present a complete plane surface because, here and there, groups of lobules of adjoining segments interdigitate, but for convenience they may be represented in diagrams as smooth lines and this is sufficiently accurate for most purposes. The inter-segmental boundaries are also often



Figure 6a

Collapse of Anterolateral and Posterolateral Segments of Right Upper Lobe. Postero-anterior radiograph of patient with carcinoma of eparterial bronchus obstructing anterolateral and posterolateral branches, showing para-hilar opacity.

marked by partial fissures on the surface of the normal lung (Fig. 7) and cases of this type have sometimes been described as supernumerary lobes.

In our description, we have chosen to represent the radiological features of consolidation and collapse of each segment. Such an account is bound to be idealistic, since true consolidation and true collapse are comparatively rare. In practice, most segmental lesions are due to a mixture of these two processes, and it is only possible to say from a radiograph that one or other element predominates. In nearly all so-called segmental consolidations, the radiographic shadow is smaller than would be expected from anatomical studies and models of inflation preparations, owing to associated collapse. Further evidence of this admixture of collapse with consolidation is often provided by: I, Emphysema of



Figure 6b

Collapse of Anterolateral and Posterolateral Segments of Right Upper Lobe. Lateral radiograph of same patient showing narrow shadow of collapsed anterolateral segment along line of lesser fissure and shadow of collapsed posterolateral segment superimposed on aorta.

an adjoining segment. II, Curving of an interlobar fissure towards the shadow. III, Compensatory displacement of the mediastinum or diaphragm. Conversely, there is nearly always some consolidation in a collapsed segment (Figs. 6c and 6d). Also, the size of each broncho-pulmonary segment, relative to its neighbors, varies somewhat in different individuals. But a knowledge of the basic pattern of the bronchi and segments, and of their radiological features in consolidation and collapse, will help the observer to recognize and identify the majority of segmental lesions.

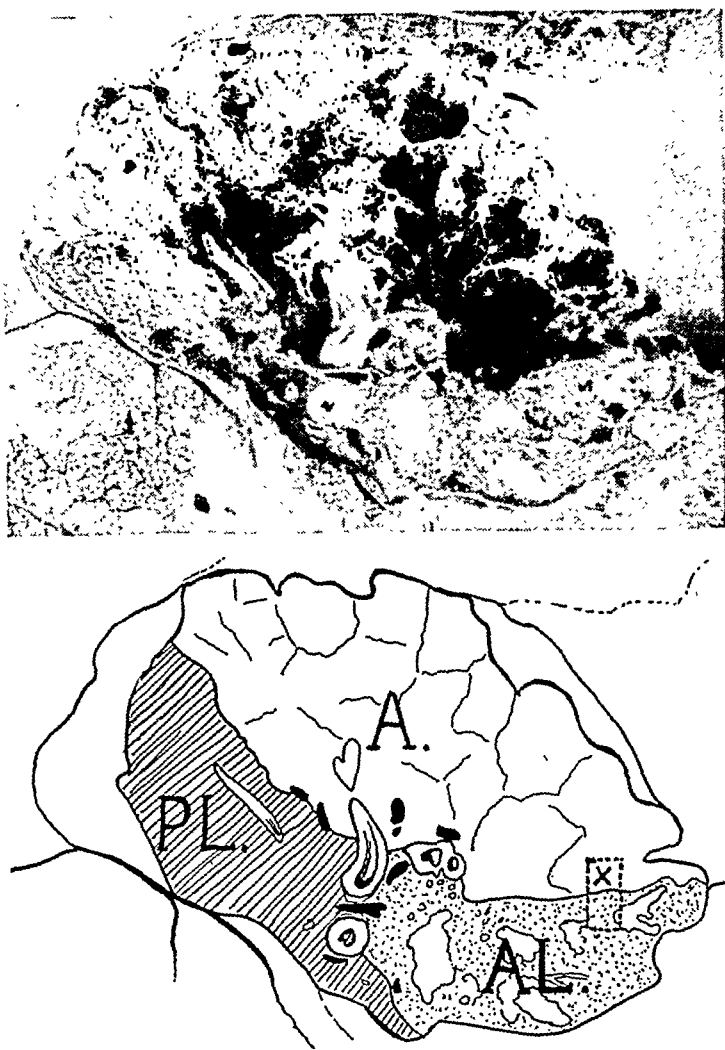


Figure 6c

Collapse of Anterolateral and Posterolateral Segments of Right Upper Lobe. Vertical section through right upper lobe of same patient, lateral view; AL, collapsed and infected anterolateral segment. PL, partially collapsed posterolateral segment. A, emphysematous apical segment.



Figure 6d

Collapse of Anterolateral and Posterolateral Segments of Right Upper Lobe. Photomicrograph of section from area marked "X" in C, showing thickened inter-segmental fissure separating emphysematous apical segment, above, from infected and collapsed anterolateral segment, below. (Lung removed by operation.)

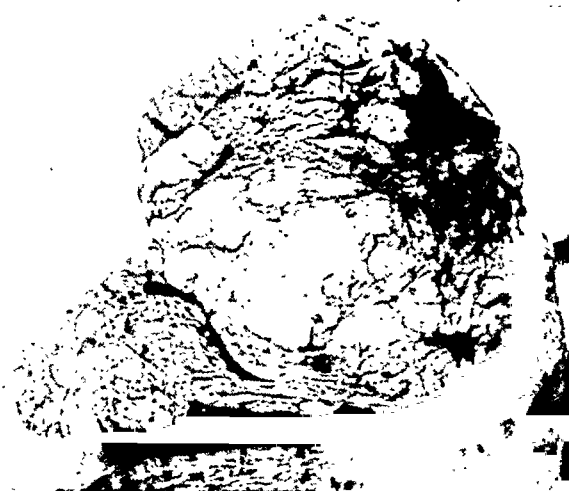


Fig. 7: Additional Fissure Between Anterior and Lateral Segments of Lingula. Left upper lobe, lateral view; lateral middle segment distended with air, remainder of lobe smaller than normal owing to fibroid tuberculosis.

THE RADIOLOGICAL FEATURES OF SEGMENTAL LESIONS

There are nine major segments in the right lung and eight in the left lung. Figures 1, 2 and 8a to 8f illustrate the bronchi, the broncho-pulmonary segments and their surface anatomy. A dis-

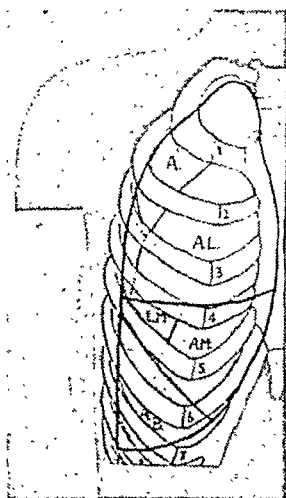


Figure 8a

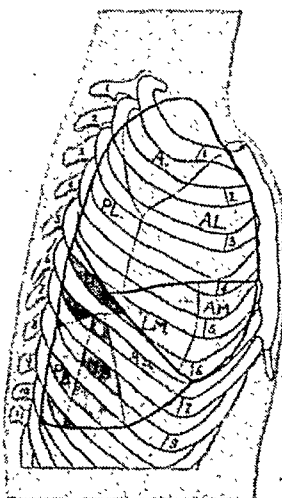


Figure 8b

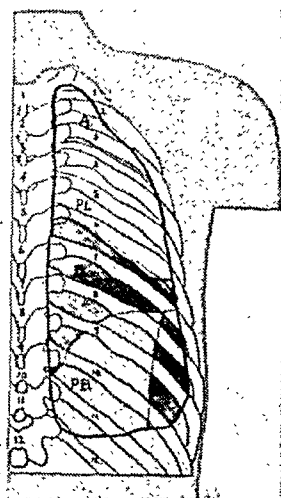


Figure 8c

The Broncho-Pulmonary Segments in Relation to the Chest Wall. *Fig. 8a:* Right lung, anterior view.—*Fig. 8b:* Right lung, lateral view.— *Fig. 8c:* Right lung, posterior view. A, Apical. AL, Anterolateral. PL, Posterolateral. LM, Lateral middle. AM, Anterior middle. D, Dorsal. PB, Posterior basic. MB, Middle basic. AB, Anterior basic.

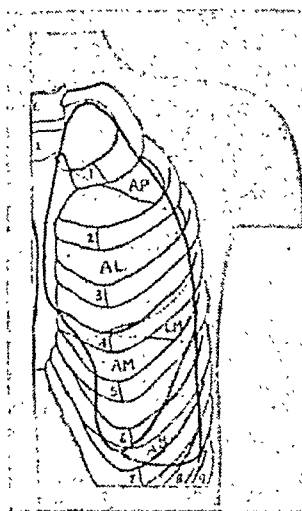


Figure 8d

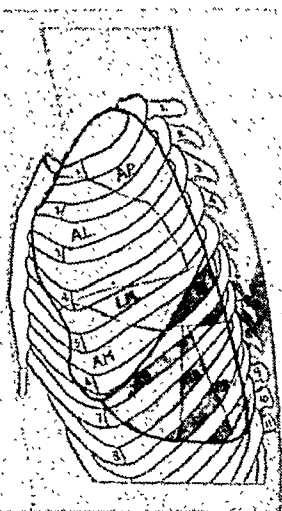


Figure 8e

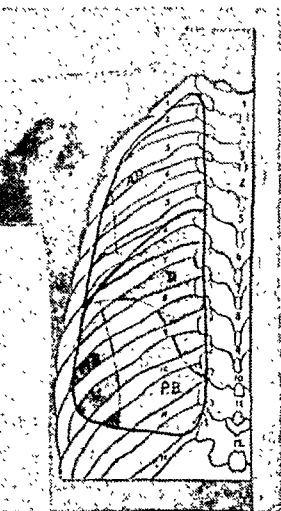


Figure 8f

The Broncho-Pulmonary Segments in Relation to the Chest Wall. *Fig. 8d:* Left lung, anterior view.—*Fig. 8e:* Left lung, lateral view.—*Fig. 8f:* Left lung, posterior view. A, Apical. AL, Anterolateral. PL, Posterolateral. LM, Lateral middle. AM, Anterior middle. D, Dorsal. PB, Posterior basic. MB, Middle basic. AB, Anterior basic.

eased segment is recognized radiographically both by its shape and by its position in relation to the thoracic cage and to the fissures of the lungs. The upper level of the oblique interlobar fissure on each side is commonly placed too high in text-book descriptions. It usually reaches only to the level of the neck of the 5th or 6th rib and is commonly somewhat higher on the left than on the right (Koch and Wieck,¹⁵ Brock¹⁶). The levels of segmental boundaries described throughout this paper are given with reference to a standard centering of the x-ray tube on the 3rd costal cartilage at five feet distance.

Right Upper Lobe:

The lobe has three major segments, corresponding to the three divisions of the eparterial bronchus.

(1) *Right Anterolateral Segment:* Consolidation of this segment appears in the postero-anterior radiograph as a dense, homogeneous opacity, roughly quadrilateral in shape, extending from



Figure 9a

Collapse of Right Anterolateral Segment. Postero-anterior radiograph showing para-mediastinal shadow at inner end of lesser fissure.

the hilum to the periphery (Fig. 5i). The lower border is limited by the lesser fissure and appears as a sharp horizontal line at about the level of the 4th costal cartilage. When there is associated collapse the fissure is often drawn up and the border then runs upwards and outwards. The upper limit of the shadow is variable; it is usually convex and slopes from the hilum upwards and outwards to reach the periphery at about the second rib. In the *lateral* radiograph, consolidation of this segment shows as a dense opacity above the lesser fissure, shaped rather like a wedge pointing towards the hilum (Fig. 5j). The lower border, formed by the fissure, is sharp and is directed horizontally or slightly downwards and forwards. The shadow extends back as far as the mid-axillary line and it is most dense in this region. There is usually a short, vertical posterior margin, merging above into the upper border which slopes upwards and forwards to the



Figure 9b

Collapse of Right Anterolateral Segment. Lateral radiograph of same patient showing band-like shadow along line of lesser fissure. Patient had a malignant stenosis of anterolateral bronchus; confirmed by bronchography and bronchoscopy.

1st costal cartilage. The shadow decreases in density from behind forward, because the lateral depth of the segment is very small anteriorly (Figs. 5h and 5j). This is well seen in sections of the injected right upper lobe (Fig. 5b). The density distribution is shown also in radiographs of the plasticene model of this segment (Fig. 5f).

Collapse of the anterolateral segment of the right upper lobe reduces its size until, when completely collapsed, it may resemble an interlobar pleurisy. In the postero-anterior view there is a small para-hilar opacity at the inner end of the lesser fissure; while in the lateral view there is a narrow, band-like shadow above the fissure (Figs. 9a and 9b).

(2) *Right Posterolateral Segment*: Consolidation of this segment has a very similar appearance in the *postero-anterior* radiograph to consolidation of the anterolateral segment (Figs. 10a and 10c), but the shadow is usually smaller, distinctly quadrilateral, less homogeneous and has a less sharply defined lower border, also there is often a clear area between the inner border of the shadow and the mediastinum. The medial border extends upwards and a little outwards from the hilum to about the 2nd interspace anteriorly when it curves outwards to form the upper border, reaching the chest wall at the level of the 1st rib. The lower

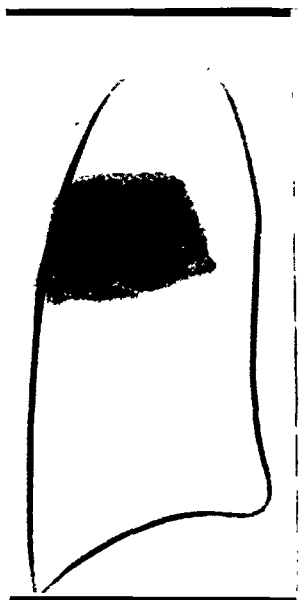


Figure 10a



Figure 10b

Consolidation of Posterolateral Segment of Right Upper Lobe. *Fig. 10a*: Postero-anterior radiograph of plasticene model.—*Fig. 10b*: Lateral radiograph of model.

border runs from the hilum horizontally or slightly upwards and outwards, at the level of the 3rd or 4th costal cartilage. The maximum density of the shadow is peripheral and it fades markedly towards the hilum. In the *lateral* view (Figs. 10b and 10d), the shadow is situated posteriorly, is homogeneous and roughly quadrilateral in shape; the lower border, formed by the greatest fissure, is clear cut and slopes upwards and backwards from the hilum to reach the level of the 6th thoracic vertebra. If the segment extends forwards, as it commonly does, to about on the lesser fissure, the lower border turns horizontally forwards for a short distance at its anterior end (Fig. 10d). The anterior border extends vertically upwards in the mid-axillary region and merges into the upper border, which is directed upwards and backwards to gain the level of the 2nd or 3rd thoracic vertebra.

Complete collapse of the posterolateral segment gives a very



Figure 10c

Consolidation of Posterolateral Segment of Right Upper Lobe. Postero-anterior radiograph showing consolidation of posterolateral segment due to chronic suppuration; raising of fissure indicates element of collapse.

indefinite shadow in the postero-anterior radiograph (Fig. 11a), but in the lateral view the shadow is linear and again may be mistaken for thickening of the interlobar fissure (Fig. 11b). Various degrees of partial collapse may be seen (Figs. 12a and 12b). Collapse of the posterolateral and of the anterolateral segment, when seen in the lateral view, may be likened to the closing of a fan, the pivot being at the hilum (Figs. 6a, 6b and 6c).

Consolidation of these segments, adjacent to the interlobar fissures, may also be confused with an interlobar effusion and the radiographic appearances of the two conditions are similar except that an interlobar effusion is uniformly dense and fusiform in shape. Bronchography will usually distinguish for certain between them.

(3) *Right Apical Segment*: When this segment is consolidated, its shadow in the *postero-anterior* radiograph occupies an area bounded above by the dome of the pleura and on the medial side

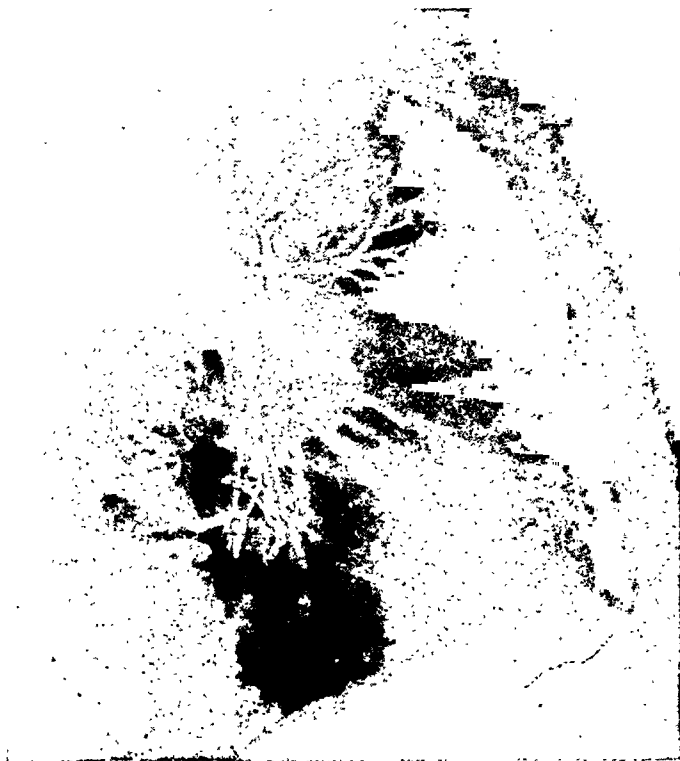


Figure 10d

Consolidation of Posterolateral Segment of Right Upper Lobe. Lateral bronchogram of same patient showing obstruction of posterolateral bronchus in consolidated segment; confirmed at autopsy.

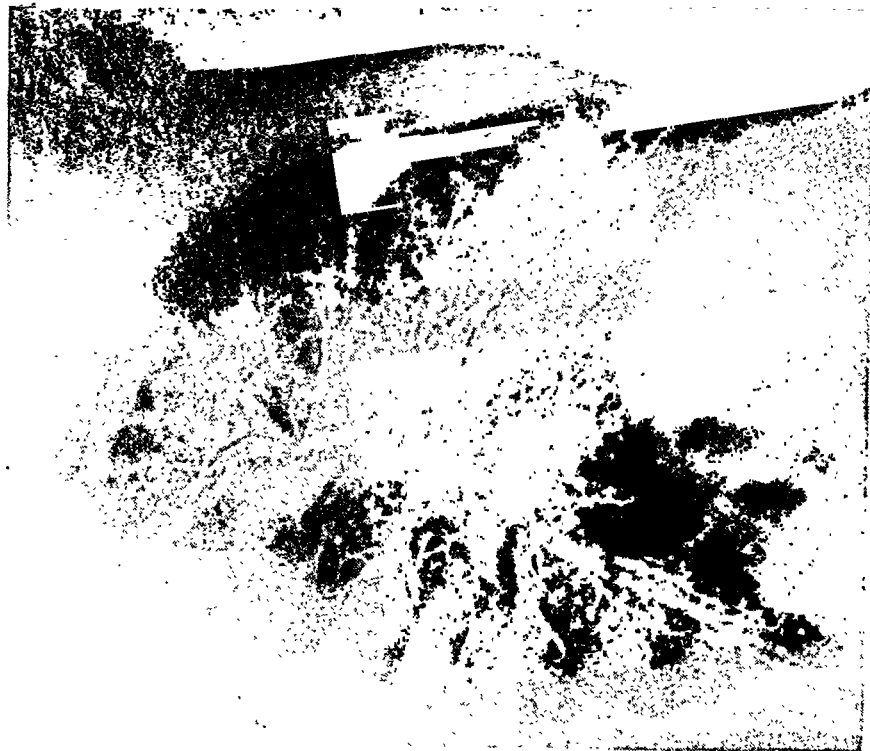


Figure 10b

Complete Collapse of Posterolateral Segment of Right Upper Lobe. Lateral bronchogram of same patient showing absence of posterolateral branch and linear shadow of collapsed segment. Patient had a tuberculous stricture of posterolateral bronchus; confirmed by lobectomy.

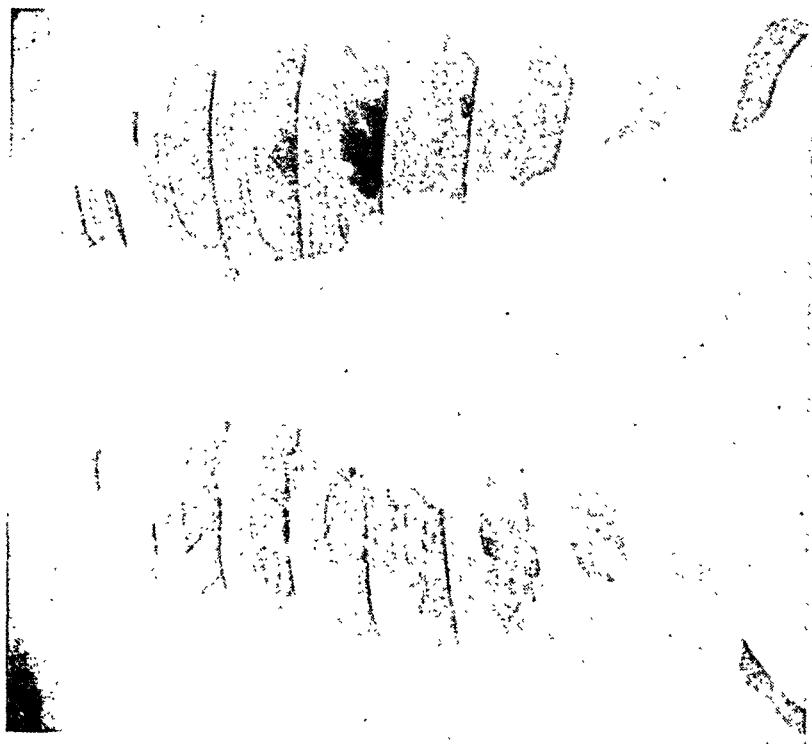


Figure 11a

Complete Collapse of Posterolateral Segment of Right Upper Lobe. Postero-anterior radiograph showing indefinite shadow at right apex.

by the mediastinum (Fig. 13a). The lateral border is concave outwards and extends from the hilum at the level of the 3rd interspace anteriorly upwards and outwards to reach the periphery at the level of the 1st or 2nd rib. In the *lateral* radiograph (Fig. 13b) the opacity extends downwards in a V shape from the apex to the hilum and is often difficult to see because of the superimposed shadows of the shoulder.

When this segment collapses it usually shrinks inwards towards the mediastinum and may only be apparent as a slight widening of the superior mediastinum in the postero-anterior view (Fig. 14).

Minor Subdivisions of the Right Upper Lobe Segments (Fig. 15a):

The anterolateral division of the eparterial bronchus divides into two branches, anterior and lateral, and the subsegments supplied by these



Figure 12a
Partial Collapse of Posterolateral Segment of Right Upper Lobe. Postero-anterior radiograph.

branches are sometimes involved separately in a pathological process. Similarly the posterolateral has two branches, posterior and lateral, while the apical division has two, anterior and posterior. These small subdivisions chiefly concern the surgeon; for instance the surgical approach to an abscess differs with the subsegment in which the abscess is situated. The lateral subsegments of the anterolateral and posterolateral divisions are not uncommonly the site of aspiration infections, either separately or together with an adjoining segment. Then, bronchography is often the only investigation which will show just how much of the lobe is involved.

Right Middle Lobe:

This lobe has two segments, corresponding to the two major divisions of its bronchus.

(1) *Right Anterior Middle Segment:* Consolidation of this segment appears in the *postero-anterior* view as a dense, roughly



Figure 12b

Partial Collapse of Posterolateral Segment of Right Upper Lobe. Lateral bronchogram of same patient showing obstruction of posterolateral bronchus due to carcinoma; confirmed by pneumonectomy.



Figure 13b

Consolidation of Apical Segment of Right Upper Lobe. Lateral radiograph of consolidated apical segment due to primary tuberculosis; concave margins of shadow indicate associated collapse.



Figure 13a

Consolidation of Apical Segment of Right Upper Lobe. Postero-anterior radiograph of consolidation of apical segment due to malignant obstruction of apical bronchus; confirmed by bronchography.

quadrangular opacity extending out into the lung field from the right border of the heart (Figs. 16a and 16c). Its upper margin lies at about the level of the 4th costal cartilage, and the lower border usually overlaps the diaphragm. The shadow extends about halfway across the lung field in this view. In the *lateral* radiograph the shadow is triangular with its apex at the hilum and its base overlapping the lower end of the sternum and cartilages from the 4th costal cartilage to the diaphragm (Figs. 16b and 16d). The upper and lower borders are formed by the lesser and greater fissures and tend to be sharply outlined. The anterior half of the shadow is very dense, but towards the hilum the density decreases rapidly owing to the pyramidal shape of the segment.

(2) *Right Lateral Middle Segment:* In the *postero-anterior*



Figure 14

Collapse of Apical Segment of Right Upper Lobe. Postero-anterior radiograph showing widening of superior mediastinal shadow due to collapsed apical segment. Aetiology undetermined, confirmed by bronchography. Basal mottling due to residual iodized oil.

radiograph, consolidation of this segment appears as a dense shadow in the right middle zone (Figs. 17a and 17c). It is usually triangular with its apex pointing downwards. Its upper margin, formed by the lesser fissure, extends horizontally across the lung field at the level of the 3rd interspace anteriorly and is usually clear cut, because, in this view, the rays pass lengthways along the fissure. The remainder of the opacity has ill defined borders and fades away below at the level of the 5th rib anteriorly. In

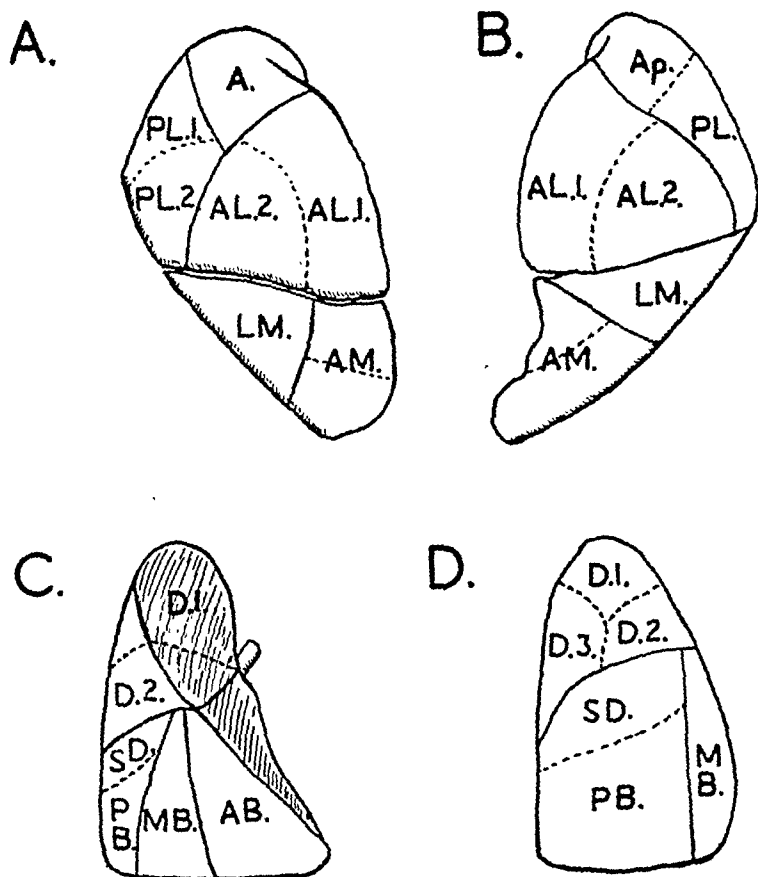


Figure 15

Minor Subdivisions of the Broncho-Pulmonary Segments. (A): Right upper and middle lobes, lateral view. (B): Left upper lobe, lateral view. (C): Right lower lobe, lateral view. (D): Right lower lobe, posterior view. AL.1, Anterior part of anterolateral segment. AL.2, Lateral part of anterolateral segment. PL.1, Posterior part of posterolateral segment. PL.2, Lateral part of posterolateral segment. A, Apical segment. Ap, Apical part of apicoposterior segment. PL, Posterolateral part of apicoposterior segment. D.1, Apical part of dorsal segment. D.2, Lateral part of dorsal segment. D.3, Medial part of dorsal segment. SD, Subdorsal part of posterior basic segment. PB, Remainder of posterior basic segment. MB, Middle basic segment. AB, Anterior basic segment.

*Figure 16a**Figure 16b*

Consolidation of Anterior Segment of Right Middle Lobe.
Fig. 16a: Postero-anterior radiograph of plasticine model.—
Fig. 16b: Lateral radiograph of model.

*Figure 16c*

Consolidation of Anterior Segment of Right Middle Lobe.
 Postero-anterior radiograph showing consolidation of right
 anterior middle segment due to benign, transient pneumonia.

the *lateral* view there is a dense triangular opacity extending forwards and downwards from the hilum and bounded above and below by the lesser and greater fissures (Figs. 17b and 17d). The shadow has a strikingly straight vertical or slightly inclined anterior margin which marks the division between the two middle lobe segments.

Segmental collapse in the right middle lobe is uncommon, although collapse of the whole lobe is often seen. Perhaps this is because the right middle bronchus is a long, narrow tube and obstructing agents, such as thick mucus, tend to be arrested in the bronchus itself before reaching its divisions. Hilar adenitis also obstructs the middle bronchus itself rather than an individual branch because of the length of this bronchus before it divides; this also places the orifices of the segmental bronchi beyond the view of the bronchoscopist.

A segmental consolidation in the right middle lobe may possibly

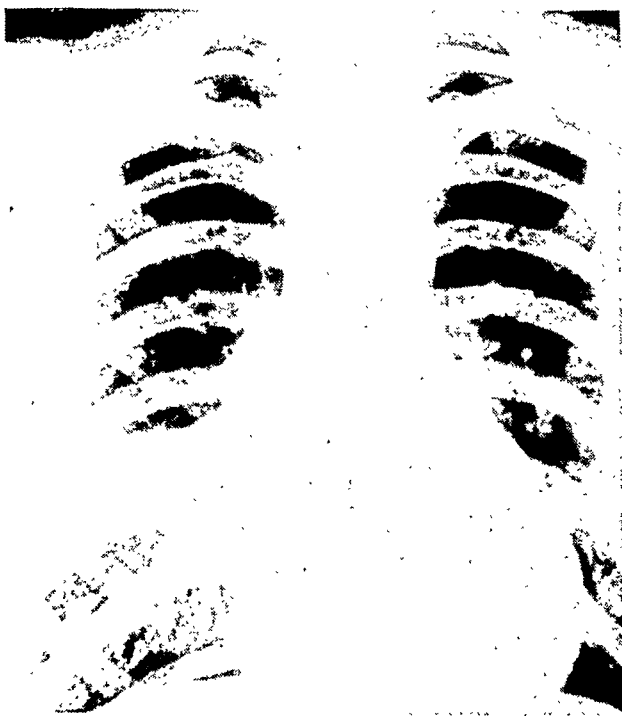


Figure 16d

Consolidation of Anterior Segment of Right Middle Lobe. Lateral radiograph of same patient.

*Figure 17a**Figure 17b*

Consolidation of Lateral Segment of Right Middle Lobe.
Fig. 17a: Postero-anterior radiograph of plasticene model.
Fig. 17b: Lateral radiograph of model.

*Figure 17c*

Consolidation of Lateral Segment of Right Middle Lobe.
Postero-anterior radiograph showing consolidation of
right lateral middle segment due to atypical pneumonia.

be confused with an interlobar effusion, but in the lateral radiograph the fusiform, homogeneous opacity of an effusion is not seen. A bronchogram will usually distinguish between the two conditions by showing the relation of the middle bronchus to the shadow.

Minor Subdivisions of the Right Middle Lobe Segments.

No useful purpose is served by subdividing this lobe any further. Lucien and Weber⁴ described a horizontal division between the upper and lower parts of the anterior middle segment.

Left Upper Lobe:

This lobe is equivalent to the combined upper and middle lobes of the right lung. Its bronchus divides into two branches, the ascending bronchus, corresponding to the eparterial bronchus and supplying the upper lobe proper, that is the part which is equiv-

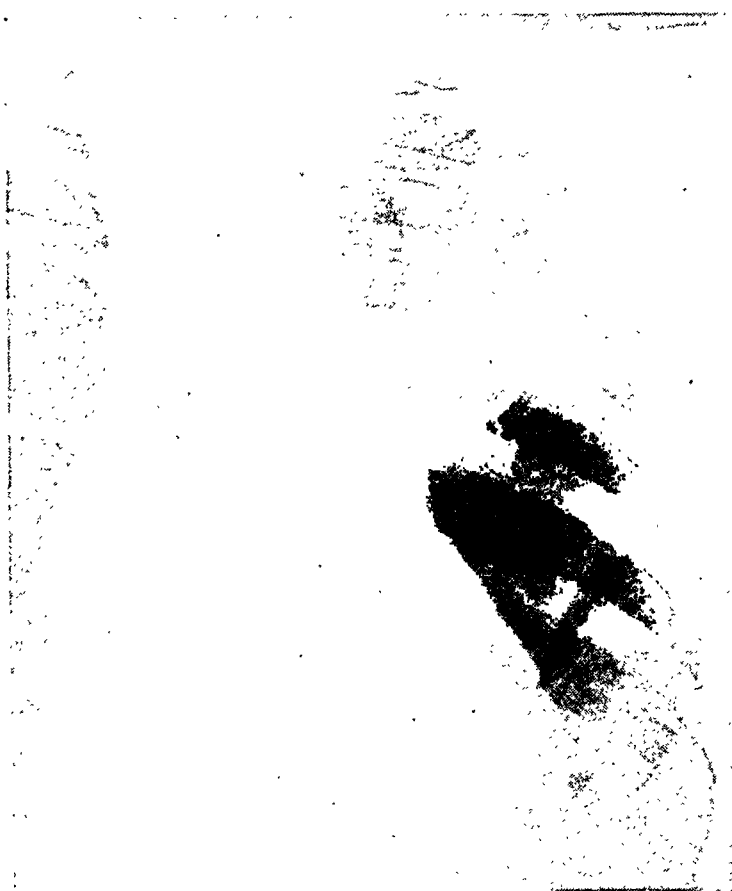


Figure 17d

Consolidation of Lateral Segment of Right Middle Lobe.
Lateral radiograph of same patient.

*Figure 18a**Figure 18b*

Consolidation of Anterolateral Segment of Left Upper Lobe.
Fig. 18a: Postero-anterior radiograph of plasticene model.—
Fig. 18b: Lateral radiograph of model (Dr. L. G. Blair's case).

*Figure 18c*

Consolidation of Anterolateral Segment of Left Upper Lobe.
 Postero-anterior radiograph showing consolidation of left anterolateral segment due to primary tuberculosis with bronchial involvement (Dr. L. G. Blair's case).

alent to the right upper lobe; and the left middle bronchus which supplies the lingula or lingual process corresponding to the right middle lobe. There are four major segments in the left upper lobe, two in the upper lobe proper and two in the lingula.

A. Left Upper Lobe Proper:

(1) *Left Anterolateral Segment:* Consolidation of this segment has a very similar radiographic appearance to that of consolidation of the right anterolateral segment (Figs. 18a to 18d). There are only two minor differences; on the left side the lower border of the segment is less sharply defined as there is normally no fissure corresponding to the lesser fissure of the right lung; and the left anterolateral segment extends farther back than its fellow on the right side. The density variations in the radiographic shadows are also similar on the two sides.



Figure 18d

Consolidation of Anterolateral Segment of Left Upper Lobe. Lateral radiograph of same patient; concave lower border of shadow indicates associated collapse (Dr. L. G. Blair's case).

When this segment collapses it sometimes tends to shrink inwards towards the hilum so that a clear area appears between it and the lateral chest wall in the postero-anterior radiograph (Figs. 19a and 19b).

(2) *Left Apicoposterior Segment*: This segment includes an area equivalent to the combined apical and posterolateral segments of the right lung. It is supplied by a single branch of the ascending bronchus. In the *postero-anterior* radiograph, consolidation of this segment appears as a large, homogeneous opacity, filling the apex of the lung above the 1st rib and extending downwards to the hilum (Fig. 20a). The outer border slopes from the 1st rib at the periphery downwards and slightly inwards to the level of the 6th or 7th rib posteriorly and then turns sharply inwards

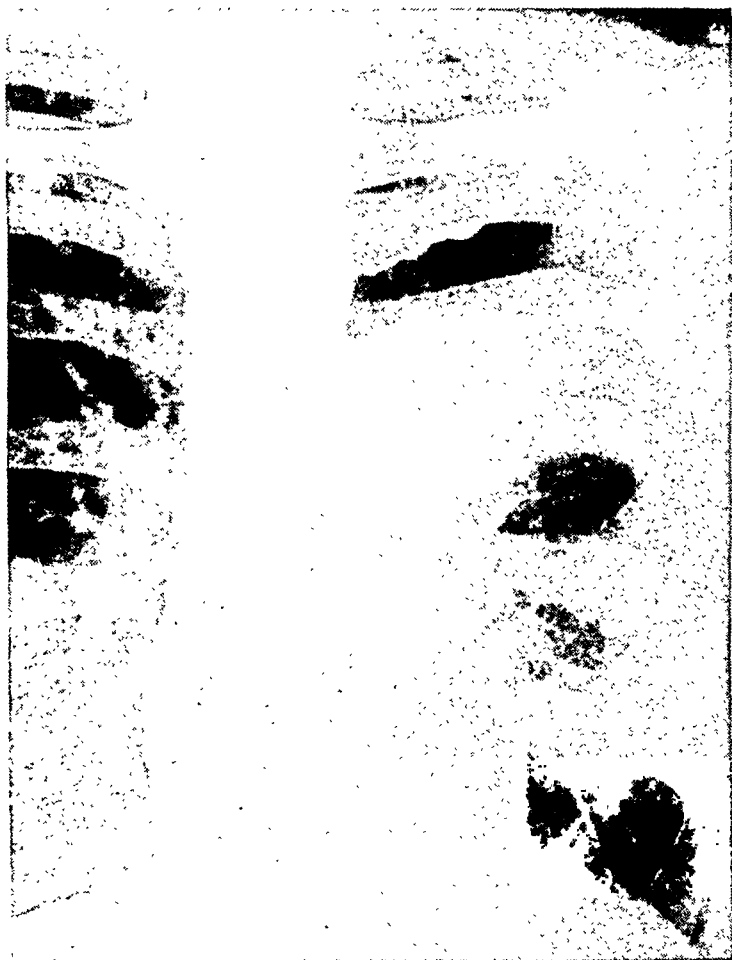


Figure 19a

Partial Collapse of Anterolateral Segment of Left Upper Lobe. Postero-anterior radiograph showing triangular, para-hilar opacity.

to reach the hilum. In the *lateral* radiograph (Fig. 20b) there is a dense opacity occupying the apex and posterior part of the upper chest where it merges into the superimposed shadows of the shoulder. The anterior margin slopes downwards and backwards to reach the interlobar fissure at the level of the 6th or 7th thoracic vertebra, behind the mid-axillary line. The postero-inferior margin is sharply defined and is bounded by the posterior end of the interlobar fissure, sloping upwards and backwards to the level of the 4th or 5th thoracic vertebra.

In the postero-anterior radiograph, collapse of the left apico-posterior segment gives a shadow which is smaller and less well-defined than that of consolidation, and the lateral border is usually concave. In the lateral view the collapsed segment appears as an elongated wedge lying along the posterior end of the fissure, with its apex at the hilum and its base fusing with the shoulder



Figure 19b

Partial Collapse of Anterolateral Segment of Left Upper Lobe. Lateral radiograph showing wedge-shaped shadow extending forwards from hilum. Patient had a small, operable carcinoma obstructing anterolateral bronchus; confirmed by bronchography, bronchoscopy and pneumonectomy.

shadow. Sometimes, as the apicoposterior segment collapses, the anterolateral segment expands and extends upwards and backwards to fill the apex. In such a case, the postero-anterior radiograph will show aeration of the extreme apex (Fig. 20a) and the shadow may be mistaken for consolidation of the anterolateral segment; the true nature of the opacity is obvious in the lateral view.

B. The Lingula or Lingual Process:

The remaining two segments of the left upper lobe form the lingula or lingual process which is, in effect, the left middle lobe and is sometimes demarcated by a fissure. The lingula is equivalent to the right middle lobe and we have therefore adopted a similar nomenclature for its segments. The left middle bronchus, supply-

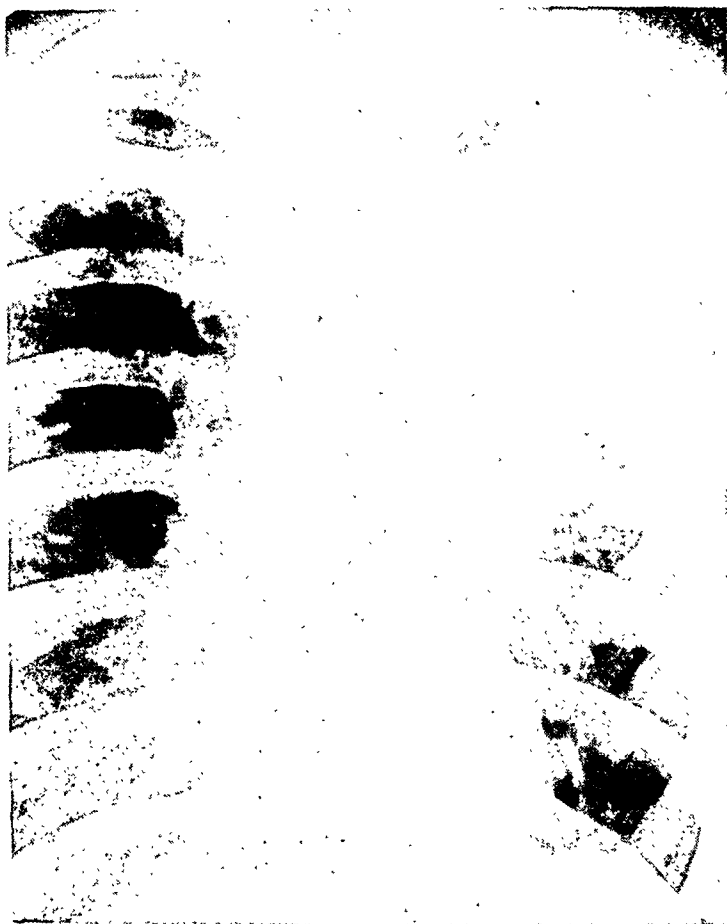


Figure 20a

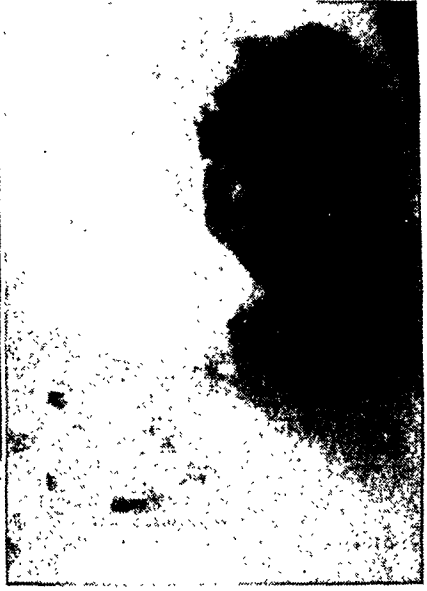
Consolidation of Apicoposterior Segment of Left Upper Lobe. Postero-anterior radiograph of patient with malignant obstruction of apicoposterior bronchus.

ing the lingula, resembles the right middle bronchus in that it divides into its two segmental branches at some distance from the hilum. Consequently, lesions involving the lingula as a whole are very much commoner than those of its individual segments, and we find in practice that it is usually sufficient to regard this area as a single unit (Figs. 22a and 22b). In the lateral view, the lingula overlaps the heart and its anterior portion is a thin, tongue-like process closely applied to the pericardium. There is therefore very little difference in contrast between a consolidation in the lingula and the superimposed heart shadow; also the outline of the opacity is often blurred by the cardiac movement. It is often most difficult to tell from radiographs how much of the lingula is involved in a consolidation. A bronchogram does not always help and the orifices of the segmental bronchi are beyond the



Figure 20b

Consolidation of Apicoposterior Segment of Left Upper Lobe. Lateral radiograph of same patient. Slight aeration of extreme apex and concave margins of shadow indicate some collapse. Confirmed by bronchography and bronchoscopy.

*Figure 23a**Figure 23b*

Consolidation of Dorsal Segment of Right Lower Lobe. *Fig. 23a*: Postero-anterior radiograph of consolidation of right dorsal segment due to pneumonia.—*Fig. 23b*: Lateral radiograph of same patient (Dr. A. S. Watts's case).

*Figure 24a**Figure 24b*

Collapse of Dorsal Segment of Right Lower Lobe. *Fig. 24a*: Postero-anterior radiograph of patient with collapse of right dorsal segment due to chronic septic bronchopneumonia.—*Fig. 24b*: Lateral radiograph of same patient showing band-like shadow and descent of posterior end of greater fissure; confirmed at autopsy.

and backwards, while the upper border is directed backwards and slightly upwards from the 4th costal cartilage to join the fissure at about the level of the 5th rib in the posterior axillary line.

Collapse of an individual segment of the lingula is uncommon and difficult to diagnose radiographically for the reasons already given.

Minor Subdivisions of the Left Upper Lobe Segments (Fig. 15b).

The anterolateral division of the ascending bronchus splits into two principal branches, anterior and lateral. The subsegment served by the lateral branch is of some importance because it is usually large and is a common site for a lung abscess. The left anterolateral segment extends farther back than its fellow on the right side so that this lateral subsegment covers a large area in the mid-axilla from the 2nd rib above to the 4th or 5th rib below. The apicoposterior division of the ascending bronchus has two branches, apical and posterolateral, which are equiv-



Figure 25a

Consolidation of Posterior Basic Segment of Right Lower Lobe. Postero-anterior radiograph of right posterior basic consolidation due to a lung abscess; confirmed by bronchography and bronchoscopy.

alent to the corresponding branches of the eparterial bronchus but are usually much smaller.

The anterior branch of the left middle bronchus commonly has two divisions, upper and lower, and the branch supplying the lateral middle segment may sometimes arise from one or other of these and not from the middle bronchus itself. This accounts for the variation in the description of these segments given by different workers. We are unconvinced of the practical value of such subdivision.

The Lower Lobes:

The two lobes are so similar that they may be considered together. The main difference between them is the presence of an additional segment, the cardiac, in the right lower lobe. In the lower mammals, such as the cat, the bronchial tree consists of a stem with a series of dorsal and ventral branches and the remains of this system may be seen in the human lower lobe.



Figure 25b

Consolidation of Posterior Basic Segment of Right Lower Lobe.
Lateral radiograph of same patient.

There is always a large dorsal branch supplying the apex of the lobe and frequently a series of lesser dorsal branches below this. The stem has become twisted outwards so that the ventral branches have a lateral bearing (Lucien and Weber⁴). There are four major segments in the left lower lobe and five in the right lower lobe.

(1) *Dorsal Segment*: Consolidation of this segment appears in the *postero-anterior* radiograph as a massive hump-like shadow extending right across the middle zone of the lung (Fig. 23a). The upper border is convex and extends upwards to the level of the 5th or 6th rib posteriorly. The lower border is horizontal or concave, often tending to curve downwards as it reaches the heart, and lies at the level of the 9th or 10th rib posteriorly. This segment often has a para-vertebral prolongation which extends down on the medial surface of the lobe as far as the 10th or 11th thoracic vertebra, but this paravertebral part is usually hidden by the heart shadow in the postero-anterior view. In the *lateral*

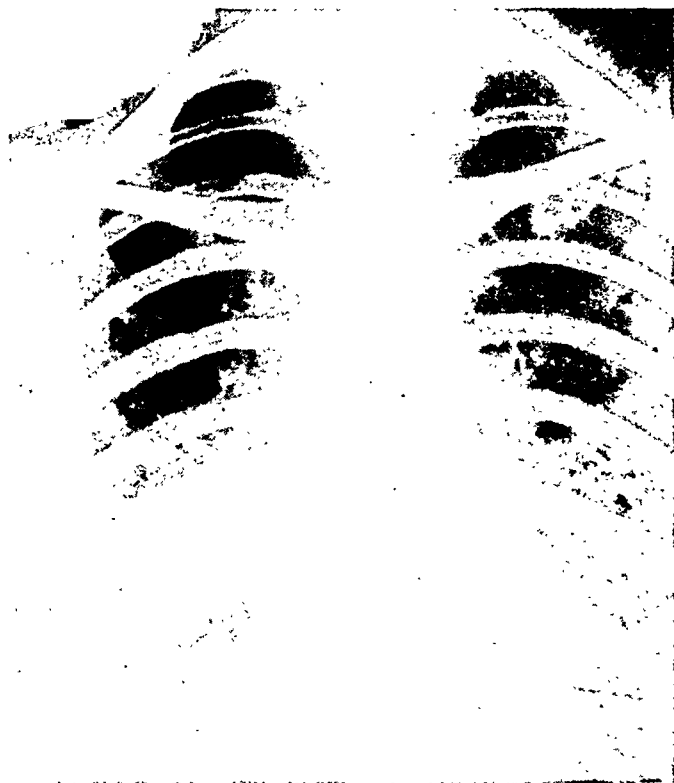


Figure 26a

Consolidation of Anterior Basic Segment of Right Lower Lobe. Postero-anterior radiograph of right anterior basic consolidation due to atypical pneumonia; confirmed by bronchography.

radiograph, consolidation of the dorsal segment gives a characteristic triangular opacity (Fig. 23b). Based on the posterior chest wall, the shadow is bounded above by the sharp line of the interlobar fissure and its lower margin slopes downwards and backwards towards the region of the 10th thoracic vertebra, becoming indistinct as it overlaps the spinal column. The apex of the shadow, in this view, extends forwards to the mid or anterior axillary line at about the level of the 5th rib in front. The dorsal segment is sometimes demarcated by a fissure which may be seen in the radiographs.

When the dorsal segment is collapsed the size of the shadow in the postero-anterior radiograph is much reduced and does not extend to the lateral chest wall (Fig. 24a). It appears as a

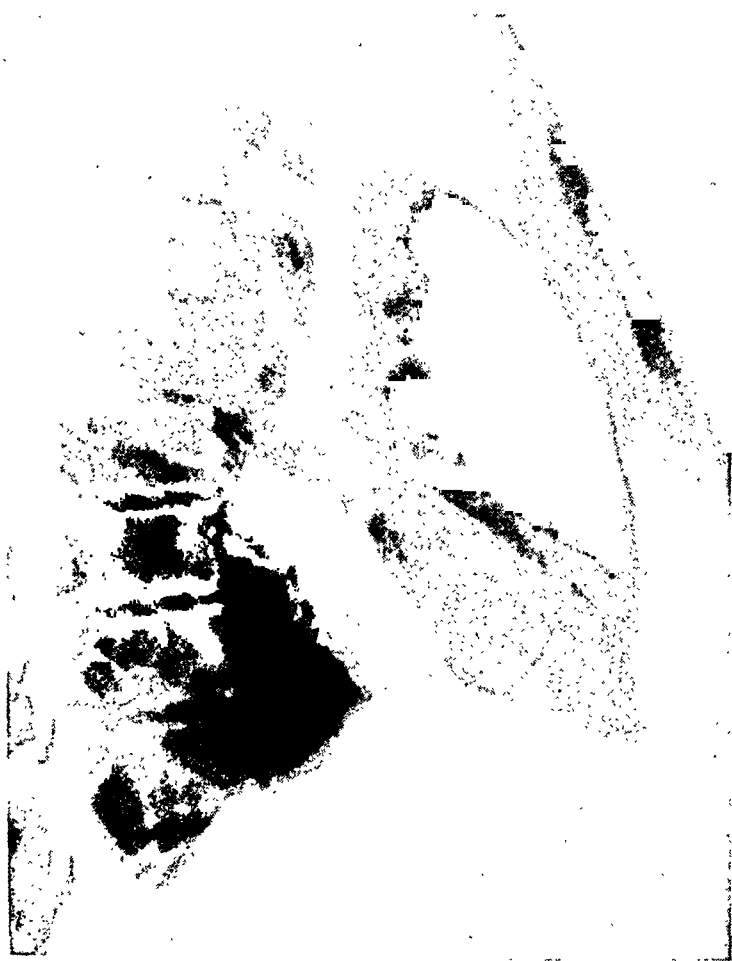


Figure 26b

Consolidation of Anterior Basic Segment of Right Lower Lobe. Lateral radiograph of same patient; the shadow is abnormally narrow owing to associated collapse,

small opacity extending out from the mediastinum at the level of the 7th or 8th rib posteriorly. In the lateral radiograph the collapsed dorsal segment casts a narrow, wedge-shaped shadow and the posterior end of the interlobar fissure is often drawn downwards to a more horizontal position (Fig. 24b).

(2) *Posterior Basic Segment*: The bronchus supplying this segment represents the terminal part of the stem bronchus and has a series of small dorsal branches. Consolidation of the posterior basic segment appears in the *postero-anterior* radiograph as an opacity extending out from the lower part of the heart shadow and obliterating the cardio-phrenic angle (Fig. 25a); on the left side it is often hidden behind the heart. The outer margin slopes downwards and outwards from the hilum to the diaphragm. In



Figure 27

Collapse of Right Anterior Basic Segment. Postero-anterior radiograph showing patchy right basal opacity. Patient had an atypical pneumonia with obstruction of right anterior basic bronchus; confirmed by bronchography.

the *lateral* radiograph, consolidation of this segment appears as a well defined, triangular shadow with its apex at the hilum and its base in the posterior costo-phrenic sulcus, extending upwards at the back as far as the 9th or 10th thoracic vertebra (Fig. 25b).

Collapse of this segment reduces the size of the shadow in the postero-anterior view and appears in the lateral radiograph as a narrow band extending from the hilum to the costo-phrenic sulcus.

(3) *Anterior Basic Segment*: This area is supplied by the first ventral branch of the lower lobe stem, which is directed for-



Figure 28a

Consolidation of Middle Basic Segment of Right Lower Lobe. Postero-anterior radiograph showing consolidation and cavitation of right middle basic segment due to tuberculosis; note lateral position of lesion in this view.

wards, downwards and laterally. When consolidated, this segment casts a very characteristic radiographic shadow. In the *postero-anterior* view, the shadow is cuneiform and is based upon the diaphragm and the adjoining part of the lateral chest wall, obliterating the costo-phrenic angle (Fig. 26a). The apex of the shadow is at the hilum and it decreases in density from without inwards. The upper border leaves the lateral chest wall about level with the anterior end of the 4th rib and slopes upwards and medially to reach the hilum at the level of the anterior end of the 3rd rib. The lower border slopes upwards and medially from the centre of the diaphragm to join the upper border at the hilum, so that



Figure 28b

Consolidation of Middle Basic Segment of Right Lower Lobe. Lateral radiograph of same patient. Arrows indicate cavity.

the cardio-phrenic angle remains clear. In the *lateral* radiograph, consolidation of the anterior basic segment appears as a dense homogeneous solid wedge extending downwards and forwards from the hilum to reach the diaphragm in front of the mid-axillary line (Fig. 26b). The anterior border is sharply defined and is formed by the interlobar fissure. The posterior margin is usually clear cut and runs almost parallel to the anterior margin though the shadow is broader at its base than at its apex.

When this segment collapses, the shadow becomes a narrow band in the lateral view and may be mistaken for thickening of the interlobar fissure. In the postero-anterior view, the collapsed anterior basic segment casts an ill defined, patchy shadow (Fig. 27).



Figure 29a

Consolidation of Cardiac Segment of Right Lower Lobe. *Fig. 29a*: Postero-anterior radiograph showing shadow obliterating right cardio-phrenic angle.

Consolidation of the anterior basic segment is often mistaken for an interlobar effusion, but it is not usually difficult to separate the two conditions. An interlobar effusion casts a much more uniformly dense shadow and in the lateral view it is fusiform in shape, in contrast to the straight edged shadow of the consolidated segment. Bronchography will, of course, distinguish between the two with certainty.

(4) *Middle Basic Segment*: This segment is supplied by the second ventral branch of the lower lobe stem which is directed downwards and laterally. In the *postero-anterior* radiograph, consolidation gives a shadow very similar to that of an anterior basic consolidation. The maximum density of the opacity lies at the costo-phrenic angle whence the shadow tapers upwards and inwards towards the hilum, becoming less dense as it nears its apex. In the *lateral* radiograph, consolidation of this segment appears as a homogeneous, wedge-shaped opacity based on the diaphragm



Figure 29b

Consolidation of Cardiac Segment of Right Lower Lobe. Fig. 29b: Lateral radiograph of same patient showing triangular opacity based on middle of diaphragm; bronchography showed dilatation of branches of cardiac bronchus.

fication makes towards accurate diagnosis and treatment been fully recognized.

Perhaps the most important contribution to diagnosis is that recognition of a segmental lesion directs attention to the condition of the related bronchus. Although it may prove to be normal, we can never afford to omit investigation of the bronchus when such a lesion persists or recurs; for the odds are then strongly in favor of finding an abnormal or obstructed bronchus, with a growth or stricture as the commonest cause. In fact, one of the best examples of the value of segmental anatomy is to be seen in bronchial carcinoma. Here, with a radiograph showing a large pulmonary opacity, it may be thought that this entire shadow is due to growth. But the growth itself is often small and the rest



Figure 31b

Consolidation of Subdorsal Part of Right Posterior Basic Segment. Lateral radiograph of same patient.

of the shadow due to consolidation or collapse of the pulmonary segment supplied by the affected bronchus. Thus recognition of the segmental nature of the lesion not only ensures prompt diagnosis and often indicates operability, but also it enables irradiation to be concentrated upon the small area where the growth is situated.

Blair, in a personal communication, points out that, in general, pneumonic lesions always tend to transgress the segmental boundaries or to affect less than a whole segment; a point which is especially true of atypical pneumonias. A truly segmental involvement is evidence against a simple pneumonic process.

A knowledge of these respiratory districts and of the appearance, position and direction of the bronchi which supply them, is essential when planning treatment by postural drainage. Such treatment is valueless and may even be dangerous if the patient is not put into the correct position which ensures dependent drainage for the affected segments. This was stressed by Nelson³ in 1932, but is still imperfectly understood, so that patients are often "drained" face downwards, when they ought to be lying in some other position (Foster-Carter¹⁰).

Another important application of segmental anatomy is in the diagnosis, localization and external drainage of a lung abscess. Early recognition is essential for the successful treatment of an acute putrid abscess, and the condition is always segmental at its onset. If it is not recognized and treated at this stage, the infection spreads, simple drainage becomes ineffective and the prognosis deteriorates rapidly. External drainage of a lung abscess must be localized to the affected segment so that normal lung tissue is not transgressed; this subject has been fully described by Brock¹² in recent papers. The value of bronchoscopy in localizing a lung abscess has been emphasized in the past (Kramer and Glass²); but variations in the bronchial tree and individual segments (Behr and Huizinga⁶; Foster-Carter⁹; Brock¹²; Appleton¹⁸) make bronchoscopy an unreliable guide unless it is used to supplement careful radiological studies.

The surgical resection of separate broncho-pulmonary segments, particularly the lingula, dorsal and anterolateral segments, is sometimes possible and has been used in the treatment of segmental bronchiectasis (Churchill and Belsey¹⁹; Blades²⁰).

A further application of segmental anatomy concerns the pathogenesis of certain pulmonary infections. A segmental distribution has been taken to indicate that such lesions are due to bronchial embolism. Though there is no doubt that this is sometimes the right explanation (Hamburger and Robertson²¹; Brock, Hodgkiss and Jones²²) it must not be forgotten that each segment has its

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 - 23 Appleton, A. B.: "The Arteries and Veins of the Lungs. I, Right Upper Lobe," *J. Anat.*, 79: 93, 1945.
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Roentgen Treatment for Hodgkin's Disease and Lymphosarcoma of the Chest

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Fifty years ago, Roentgen announced to the world his discovery of peculiar rays which had the property of passing through substances of low atomic weight. Not knowing what these rays were, he called them "X-rays". This discovery caused a tremendous sensation, and within a few months the new rays were already being applied to the examination of fractures and dislocations of bones, to find foreign bodies and to determine the possible influence of the rays on certain pathologic conditions. Now, after half a century, what does one find? Every hospital and clinic has a more or less important department of roentgenology, and every practicing physician must make use of Roentgen's rays for diagnosis and for treatment. For a physician to practice medicine without the help of these rays would now seem an unbelievable anachronism and would label him an old fogey.

Whenever treatment with roentgen rays is mentioned, lay persons as well as many physicians immediately assume that treatment of malignant tumors is meant. This is far from true. At the present time and for some years roentgen rays have been used increasingly for the treatment not only of tumors but also of inflammatory conditions, acute and chronic. In several previous communications I have dealt with the treatment of inflammatory lesions. In this paper I shall attempt to set forth basic ideas about the treatment of malignant neoplasms, especially as it applies to neoplasms of the chest. But in order to understand how this kind of treatment acts on tumors it is important to know certain fundamental principles which are based on a large body of experimental evidence as well as on extended clinical observations.

SENSITIVENESS OF NORMAL CELLS

Each variety of cell in the body is specifically sensitive to roentgen rays. Certain varieties of cells are extremely sensitive and are destroyed or injured by small doses; other varieties are resistant and can tolerate large doses with apparent impunity. This does not imply that a given dose of rays can destroy all cells of a given variety in the irradiated territory, because the sensitiveness of any kind of cell varies somewhat from cell to cell. It

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would be more accurate to say, therefore, that each variety of cell has a specific range of sensitiveness.

When cells of a given kind are exposed to a certain dose of radiation, some are destroyed, some are injured but regenerate later, and some do not show any deleterious effect. This variation in the susceptibility of different cells of the same kind is probably due to the metabolic stage of the cells and perhaps to other unknown factors. Whatever the main reason for variation in the radiosensitiveness of different cells of the same variety may be, this does not affect the fundamental law of the specific sensitiveness of different varieties of cells, a law based on innumerable experiments on animals and substantiated by extensive clinical observation.

According to present knowledge, cells may be classified, in the order of the degree of their sensitiveness, as follows:

Lymphoid cells (lymphocytes in the spleen, lymph nodes, intestinal lymph follicles, circulating blood, bone marrow, thymus, tonsil and other structures in which these cells may be present).

Polymorphonuclear leukocytes and eosinophils in the blood or tissues.

Epithelial cells: (1) basal epithelium of certain secretory glands, especially the salivary glands; (2) basal epithelium (spermatogonial cells) of the testis and follicular epithelium of the ovary; (3) basal epithelium of the skin, mucous membranes and certain organs, such as the stomach and small intestine; (4) alveolar epithelium of the lungs and epithelium of bile ducts (liver) and (5) epithelium of tubules of the kidneys.

Endothelial cells of blood vessels, pleura and peritoneum.

Connective tissue cells.

Bone cells.

Muscle cells.

Nerve cells.

Although the difference in susceptibility between the most sensitive and the least sensitive varieties of cells is considerable, no cell in the body is wholly invulnerable to radiation; all cells, whatever their variety, may be destroyed or injured if exposed to a sufficiently large dose of rays, especially if doses within the therapeutic range are disregarded. The experiments of Bergonié and Tribondeau¹⁻⁹ and others have shown conclusively that the younger and the more active the cell, from a metabolic point of view, the more susceptible it is to the influence of the rays. Cells which naturally undergo rapid mitotic division and the life cycle of which, therefore, is comparatively short are most sensitive; and cells which have a long life cycle are relatively resistant to the rays. But the relation of the age of the cells to the relative sensitiveness is less important than the specific vulnerability of the different varieties of cells,

In order to give a clear idea of the effect of irradiation on cells, I shall describe the changes which can be observed in sensitive cells, such as lymphocytes, after exposure to roentgen rays.

The exceptional sensitiveness of lymphocytes was established by the early experiments of Heineke¹⁰⁻¹² and has since been fully confirmed by Krause and Ziegler,¹³ Fromme,¹⁴ Jolly,¹⁵ Tsuzuki,¹⁶ Piepenborn,¹⁷ Warthin¹⁸ and many others. When the entire body of an animal is exposed to roentgen rays, the spleen, the mesenteric and other lymph nodes, the intestinal lymph follicles, the blood and bone marrow, the thymus in young animals and other collections of lymphoid tissue show a more or less marked destruction of lymphocytes, and the degree of destruction is proportional to the dose of rays and to the interval between irradiation and death. As the number of intact lymphocytes in the spleen and lymph nodes diminishes, the stroma becomes more prominent, and this feature may become so pronounced that the malpighian corpuscles or lymph follicles may largely disappear and may be recognized only by the blood vessels and by the concentric arrangement of the corpuscular or follicular stroma. Heineke found destruction of lymphocytes two hours after irradiation, but Warthin, who examined the lymphoid structures sooner after exposure to the rays, found unmistakable evidence of lymphocytic disintegration within fifteen minutes after irradiation.

The destruction of these cells is characterized by disorganization and fragmentation of the nuclear chromatin and by scattering of the fragments of chromatin between the remaining intact cells and in the spaces of the reticular stroma, where the fragments gather into clumps or balls. The extent and the duration of this destructive phase depend on the intensity of irradiation. It may continue from one to several days and may be accompanied by a progressive reduction in volume or atrophy of the affected lymphoid structures. Then the clumps or balls of degenerate chromatin are gradually taken up by some of the reticular cells, which assume a phagocytic property and swell as the amount of ingested chromatin debris increases. The phagocytic disposal of chromatin material from the destroyed cells may continue until the lymphocytes are largely destroyed, but a certain proportion of the cells appear to resist the action of the rays. Some hours or days later, the phagocytic reticular cells themselves begin to disappear. The chromatin debris ingested by the phagocytes apparently undergoes intracellular digestion, because the number and size of the ingested fragments diminish steadily. From seven days to three weeks after irradiation, more or less regeneration of lymphoid tissue may be observed.

Similar changes occur in other kinds of cells but, because they

are less sensitive, a larger dose of rays is required to produce an equivalent effect or, if the dose of rays is the same, fewer cells are affected and the effect is less pronounced. Also, the cellular changes induced by irradiation do not begin so soon after exposure and do not last so long. This difference increases as the relative sensitiveness of other kinds of cells decreases.

SENSITIVENESS OF MALIGNANT TUMORS

The sensitiveness of tumors to roentgen rays corresponds closely to that of the cells of which the tumors are chiefly composed. Thus, tumors derived from lymphoid cells or from the basal cells of the genital glands (testis or ovary), as well as from the embryonal epithelium of the kidney in children (Wilms' tumor), are extremely sensitive. Neoplasms arising from adult epithelium are only moderately sensitive and tumors derived from connective tissues are much more resistant. Like different varieties of normal cells, malignant tumors of different kinds can be classified according to their sensitiveness to roentgen rays. Elsewhere I have ventured to make such a classification, and those who may be interested will find the reference in the bibliography.¹⁹

Knowledge of the comparative sensitiveness of different kinds of neoplasms often makes it possible to distinguish certain varieties of tumors from other varieties which are more or less sensitive, and this method can often furnish information of the greatest value and could be employed much more than it now is. Thus, in connection with intrathoracic tumors, exposure to roentgen rays almost always permits one to establish a clear distinction between Hodgkin's disease or lymphosarcoma and an aneurysm of the aorta, between these forms of lymphoblastoma and carcinoma of a bronchus, neurofibroma, fibrosarcoma, teratoma, or a desmoid tumor, or between lymphoblastoma and tuberculous adenitis. Moreover, when the action of roentgen rays on a tumor is correlated with the history, clinical features and physical findings, the diagnostic value of this therapeutic test can be extended considerably. Needless to say, the use of this test requires extended experience and, as will be explained later, the treatment must be arranged in a certain manner. Mere exposure to a roentgen tube in operation is not sufficient.

CLINICAL AND OTHER CONSIDERATIONS

Before considering roentgen treatment for these conditions, it would not be amiss, perhaps, to review a number of points which often have an important bearing on treatment.

In the average case, from a clinical as well as from a therapeutic point of view, these forms of lymphoblastoma are identical. By

this I mean that, in both of these conditions, the pathologic process can begin in the same region and can invade other groups of nodes in precisely the same manner and at the same rate. Clinically, in other words, there is no essential difference between them. From the standpoint of treatment, also, these conditions are influenced by a given dose of roentgen rays in the same manner and at the same average rate. In the past, some writers have claimed that lymphosarcoma is more sensitive to roentgen rays than Hodgkin's disease, and vice versa. This contention, I am convinced, has been based on limited experience. After having treated more than 5,000 patients during the past twenty-five years, I have been forced to conclude that, in the average case, these conditions are so nearly identical that one cannot be distinguished from the other, either clinically or therapeutically. To me they appear to be members of the same family.

Hodgkin's disease and lymphosarcoma are more common than earlier writers have led one to believe. This is probably because these conditions begin very insidiously; because, in the past, they were often mistaken for other conditions, such as tuberculous adenitis; and because, even now, in some cases the disease is not recognized until the pathologic process has reached a rather advanced stage. Another reason is that too much attention has been concentrated on the lymph nodes in the neck, armpits and groins. It is true that these conditions often begin in the cervical lymph nodes or in the nasopharynx or tonsil, but when any or all of these structures are involved, this does not necessarily mean that the process began there. In about an equal percentage of cases these conditions begin in the retro-abdominal lymph nodes, especially the para-aortic or iliac nodes, but sometimes the mesenteric nodes also are affected sooner or later.

As far as the lymph nodes in the chest are concerned, those in the mediastinum (right and left paratracheal nodes or tracheo-bronchial nodes, or both) are most commonly involved. However, Hodgkin's disease or lymphosarcoma begins in the mediastinal nodes much less commonly than it begins in the head, neck, or retro-abdominal nodes. In most cases, when the mediastinal nodes are invaded, the involvement of these nodes is secondary to similar, but earlier, involvement of lymph nodes in other regions.

An interesting, and sometimes an important, point to remember is that, when lymph nodes in the axilla are affected by these conditions, the mediastinal nodes also are usually involved, although in some cases involvement of these nodes cannot be demonstrated easily because the nodes have not become sufficiently large to project beyond the borders of the sternum and spinal column; and the reverse is often true, but the latter is less common than

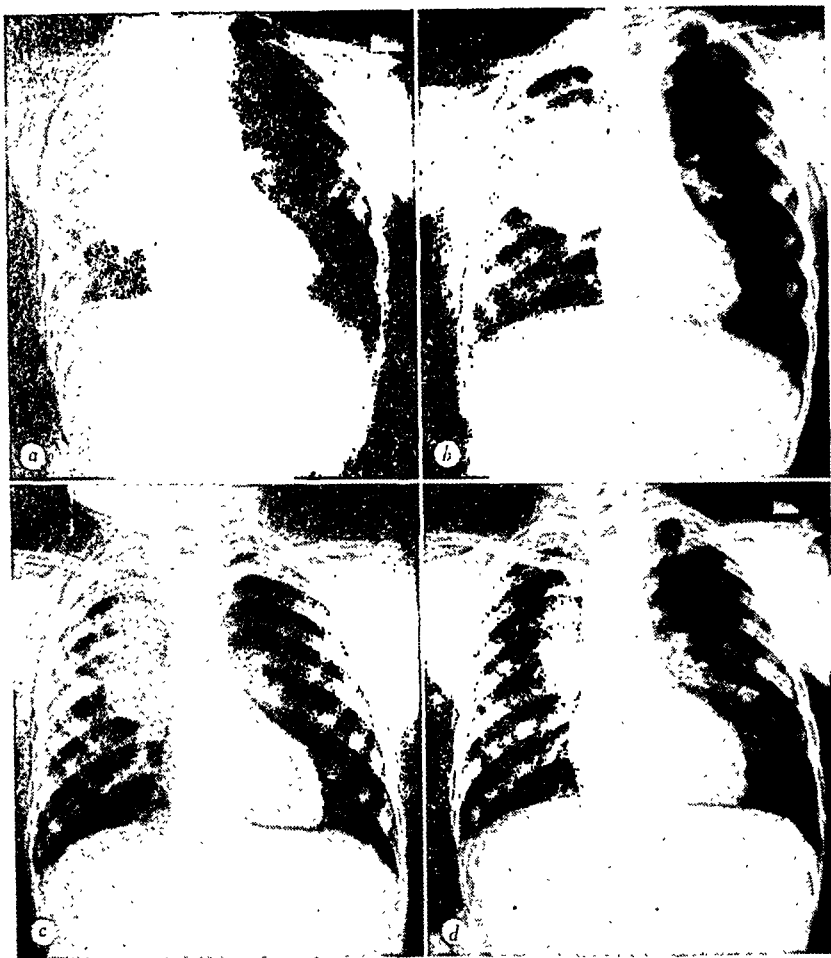


Figure 1: Roentgenograms of the chest in case 1.

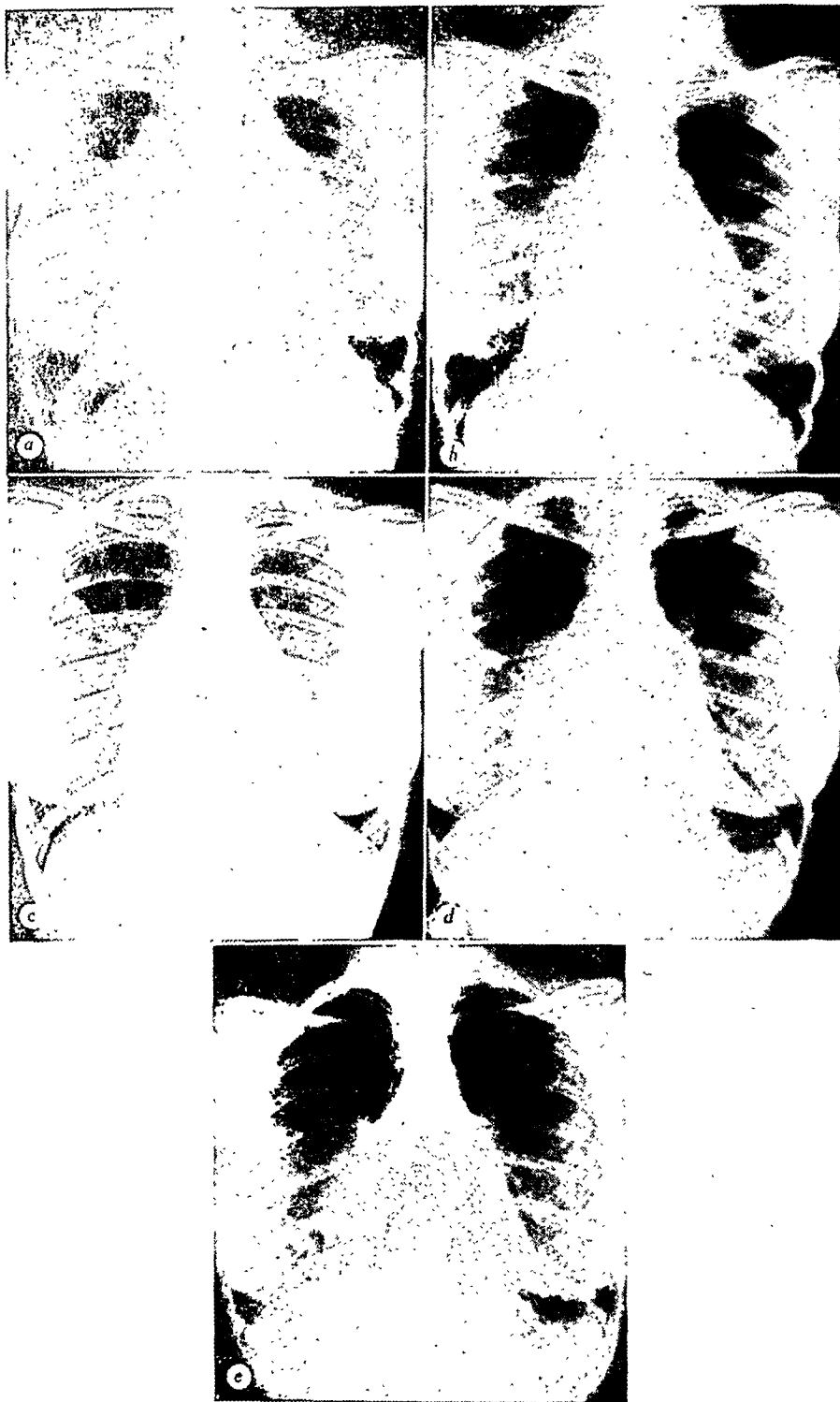
Fig. 1a: Roentgenogram made on December 3, 1941. It shows an enormous tumor occupying the upper two thirds of the space ordinarily occupied by the right lung. Clinically or roentgenologically, it would be impossible to know which of several kinds of tumor this could be.—*Fig. 1b:* Roentgenogram made on December 22, 1941, three weeks after a course of roentgen treatment. It shows marked regression of the tumor. This rapid regression clearly indicated that the growth was a manifestation of lymphoblastoma (Hodgkin's disease or lymphosarcoma) and that it could not be a carcinoma, fibrosarcoma, neurofibroma, dermoid, teratoma or Pancoast tumor.—*Fig. 1c:* Roentgenogram made on December 26, 1941, without further treatment. It shows still greater regression of the tumor and this strongly confirms the previous conclusion.—*Fig. 1d:* Roentgenogram made on January 12, 1942, without additional treatment. It shows marked regression of the tumor which was then only a small fraction of its original size. A tumor derived from epithelial, connective or nerve tissue, or a teratoma, could never be influenced so rapidly and so much by roentgen rays. In this case, the rate of regression was somewhat more rapid than in the average case of mediastinal lymphoblastoma.

hilus of the lungs, but sometimes the nodes principally involved are in the anterior part of the mediastinum, and they may or may not be visible in roentgenograms. It is important to remember that, for lymph nodes to project laterally beyond the composite shadow cast by the sternum and spinal column, they must be rather large or numerous. Sometimes mediastinal nodes that are not large enough to be seen in roentgenograms may nevertheless cause symptoms, such as cough, or pain around one or both shoulders or in one or both of the upper extremities. Roentgen treatment directed toward the mediastinum through two large anterior and two corresponding posterior fields often causes these symptoms to abate rapidly or to disappear.

When Hodgkin's disease or lymphosarcoma involves the mediastinal nodes a roentgenogram of the thorax usually reveals a bilateral and roughly parallel widening of the shadow projected by the mediastinal structures, which extends from the suprasternal notch downward to the cardiac shadow which it overlaps more or less. This shadow is cast by affected right and left paratracheal nodes. In many cases the tracheobronchial nodes also are involved more or less extensively, and they cast an irregularly nodular shadow which projects outward beyond the vertical and parallel shadow produced by the paratracheal nodes. But in other cases roentgenography may not reveal this "typical" appearance, but may disclose a small or large tumor apparently confined in one side of the chest. Often this is situated in the upper part of the chest, where it may occupy space ordinarily taken by a portion of the upper lobe of one lung, or by all of it (Fig. 1). The tumor may be round and sharply circumscribed; it may be irregular and may have ill-defined and feathery margins, or it may have the form of a bird's wing, and its appearance may suggest extension upward and outward from the mediastinum. Certainly there is nothing characteristic about it and the tumor could as readily be carcinoma, fibrosarcoma or some other malignant growth, as Hodgkin's disease or lymphosarcoma. Besides the foregoing, other unusual forms may be observed in different cases.

Sometimes, besides more or less definite involvement of mediastinal nodes, an abnormal shadow may extend outward between two lobes of one lung as far as the periphery; this may be caused by infiltration of the interlobar pleura and, if so, roentgen treatment should cause it as well as the affected nodes of the mediastinum to diminish or disappear.

Occasionally, the nodes chiefly involved are high in the mediastinum (Fig. 2) and the symptoms may include not only dyspnea, with or without dysphagia, but also a brassy cough, hoarseness from involvement of one or both recurrent laryngeal nerves, puff-



Rarely, Hodgkin's disease or lymphosarcoma may infiltrate the lungs in what approximates a miliary manner or it may have the appearance of a falling, wet snow. That is, the infiltration is scattered more or less uniformly throughout the lungs and may readily be confused with metastasis from carcinoma or with some forms of tuberculosis. Infiltration of this kind indicates that lymphoblastoma has invaded most or all of the small aggregations of lymphoid cells situated at the junction of the smaller branches of the bronchi. This also is a relatively late complication. Nevertheless, thorough treatment may result in pronounced improvement, the duration of which may vary greatly in different cases.

In a small proportion of cases, Hodgkin's disease or lymphosarcoma, instead of affecting chiefly nodes in the anterior or middle part of the mediastinum, involves mainly nodes in the posterior mediastinum, and as the affected nodes continue to enlarge, one of two things may occur: either the enlarging nodes cause pressure on adjacent vertebrae and destructive erosion of some of these bones occurs, or the pathologic process may infiltrate an intervertebral space and thence may extend into the spinal canal, where it may even invade the spinal cord. When roentgenograms of the spinal column reveal destructive changes in one or more vertebrae, this is often assumed to represent metastasis from carcinoma, even when a primary tumor in some epithelial structure cannot be found, when the patient is rather young to be afflicted with carcinoma, when his general condition is altogether too good considering the character and duration of

Figure 3: Roentgenograms of thorax in case 3.

Fig. 3a: Roentgenogram made on July 31, 1944. It shows an enormous intrathoracic tumor with bilateral involvement and with an outward projection toward the periphery on the right side. Besides the intrathoracic tumor, the neck was enormously and diffusely enlarged; the enlargement was smooth and soft and gave the impression that a large volume of air had been injected beneath the skin. This enlargement of the neck was not caused by air, but by distention and engorgement of veins from pressure on the great vessels just below the thoracic inlet and by enlargement of cervical lymph nodes.—*Fig. 3b:* Roentgenogram made on November 14, 1944, after two courses of roentgen treatment, part of which was directed toward the chest and part of it toward the neck. During and after the first course of treatment, the size of the intrathoracic tumor as well as the enlargement of the neck diminished steadily. The patient's condition improved rapidly, and the malignant process continued to regress after the second and third courses of treatment. By that time the enlargement of the neck as well as the cough and dyspnea had disappeared, the patient's weight had increased six pounds (2.7 kg.) and she looked much better.—*Fig. 3c:* Roentgenogram made on January 22, 1945, after three courses of roentgen treatment. It shows marked, but still incomplete, regression of the intrathoracic tumor.—*Fig. 3d:* Roentgenogram made on April 4, 1945. It shows still greater regression, but on the right side at the level of the hilus there is evidence of fresh enlargement of lymph nodes. On this account a fourth course of treatment was given.—*Fig. 3e:* Roentgenogram made on May 21, 1945. It shows still greater regression of the intrathoracic tumor. The patient was entirely free from symptoms and may remain so for an indefinite period.

his illness and when enlarged nodes in other regions would hardly be consistent with a diagnosis of carcinoma or epithelioma.

TREATMENT

When a thoracic or intrathoracic tumor is suspected of representing Hodgkin's disease or lymphosarcoma, this suspicion can often be confirmed or excluded. Since tumors of this kind are largely composed of hyperplastic lymphoid cells, they are usually very sensitive to roentgen rays, a sufficient dose of which causes the tumor or tumors to retrogress rapidly. The rate and degree of regression vary to some extent in different cases, and this variation is undoubtedly related to histopathologic differences in the affected lymphoid structures. Nevertheless, in the majority of cases a lymphoblastomatous tumor in the mediastinum or chest can be expected to shrink from 30 to 100 per cent within three or four weeks after a well-planned course of treatment. Naturally, the degree of regression in each case depends on the size of the enlarged nodes before treatment.

In some cases the first course of treatment may not cause the tumor to diminish more than 25 per cent; as I have already mentioned, this may be due to the presence in the tumor of an exceptional proportion of connective tissue, which prevents the growth from being influenced as much as it would be otherwise. Another element which may diminish the effect of the rays is the association in the affected mediastinal nodes of Hodgkin's disease or lymphosarcoma and tuberculosis, but this association occurs only in a small percentage of cases. A third factor which may prevent enlarged lymph nodes in the mediastinum or elsewhere from being influenced by the rays as much as would usually be expected is related to the stage of the pathologic process. When the malignant process has reached an advanced stage or has entered the terminal phase, when several groups of nodes in different parts of the body, and especially the retro-abdominal (para-aortic, mesenteric or iliac) and mediastinal nodes are extensively involved, and when the patient's general condition has deteriorated considerably, the influence of the rays may diminish and the affected lymphoid structures may respond less than usual or may not respond at all. This varies more or less in different cases, but the general rule holds.

Sometimes a patient may appear to be quite ill and may have severe dyspnea or orthopnea, severe cough, a rapid pulse, and one or both pleural cavities may contain a considerable amount of fluid; yet well-planned treatment may still be accompanied and followed by rapid and marked improvement. This is especially true when the nodes in other regions are not greatly involved,

but it may be true even when they are; under these circumstances, however, the degree of improvement is not likely to be so great or to last so long.

Anatomic arrangement of the treatment: Whether the treatment is given to distinguish one variety of tumor from another variety, or whether it is given purely for its therapeutic effect, it should be arranged in the same manner, and this arrangement depends mainly on the situation of the affected structures and on the pre-dominating symptoms.

In the majority of cases in which the mediastinal lymph nodes are involved, treatment should best be arranged through two large anterior and two corresponding posterior fields, as shown in figure 4. How large the fields should be depends on the size of the patient. Vertically the fields should extend from the level of the suprasternal notch down to the level of the ensiform cartilage. Horizontally, or transversely, they should extend from the median line to the anterior axillary line. The four beams of rays should be directed toward the central part of the chest at an angle of 30 or 40 degrees. When, as is commonly done, treatment is arranged through only two fields (one anterior and one posterior), its effect is much less favorable. This is not surprising, because, with the former arrangement (two anterior and two posterior fields), the quantity of rays reaching the mediastinal structures and the inner portion of the lungs is twice as great (or nearly so) as when treatment is given through only two fields (one anterior and one posterior).

When the nodes principally affected are in the upper part of

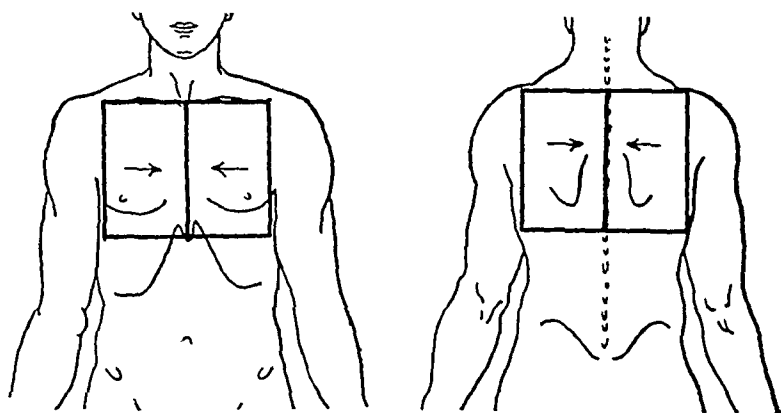


Fig. 4: Arrangement of fields for treatment of the mediastinum and lungs. The arrows indicate that the four beams should be directed inward more or less according to whether the treatment is directed only toward the mediastinal structures and inner part of the lungs or is directed toward the mediastinum and greater part of the lungs.

the chest, just below or in the inlet of the thorax, and when the symptoms and physical signs indicate pressure on the superior vena cava and innominate veins, whether or not the deep cervical nodes also are involved, treatment should be directed toward the mediastinum in the manner which has been described, but it should also be directed toward the thoracic inlet and lower half of the neck through two additional fields, as shown in figure

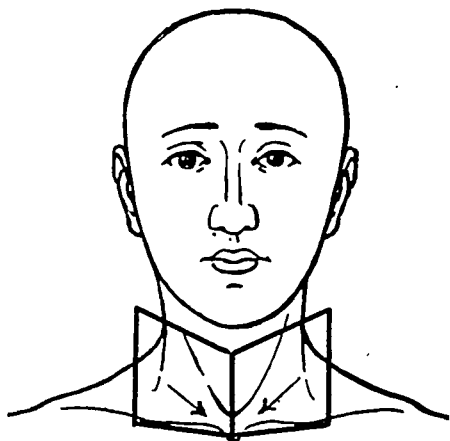


Fig. 5: Arrangement of fields when, besides the mediastinum, the inlet of the thorax and lower part of the neck also should be treated. The arrows indicate that the two beams of rays should be directed inward and downward toward the thoracic inlet.

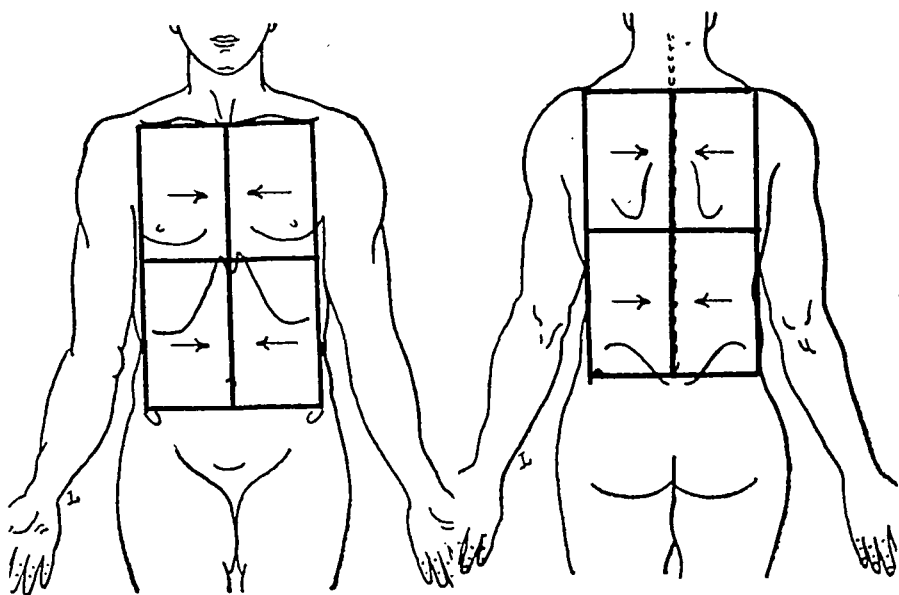


Fig. 6: Arrangement of fields when, besides the mediastinum and central part of the lungs, treatment should also be directed toward the upper half or two thirds of the abdomen. The arrows indicate that all the beams of rays should be directed inward and backward (anterior fields) or inward and forward (posterior fields).

5. And when, besides involvement of mediastinal nodes or lungs, the retro-abdominal nodes also are affected, additional treatment should be directed either toward the upper half of the abdomen through two anterior and two posterior fields (Fig. 6) or toward the entire abdomen through four anterior and two of four posterior fields (Fig. 7), according to circumstances.

Quality of the rays: For some years it has been a sort of fashion to treat all kinds of malignant tumors with rays generated at 200, 400, 600 or even 1,000 kilovolts and filtered through 0.5, 0.75, 1.0 or 2.0 millimeters of copper, or even more, and to administer treatment by the so-called fractional method, with as large a total dose as possible. This idea sprang from the results of experiments on animals performed by Regaud and his co-workers,²²⁻³⁴ and by others; these experiments had shown that, when living tissue is exposed to roentgen rays in small, fractional doses, a much larger total dose can be given without producing serious damage than when the same tissue is exposed to a single dose at one time. The experiments of Wood and Prime³⁵ in this country had shown that, in order to stop the growth of epithelial tumors, a total dose of rays from five to eight times the limit of tolerance of any given area of skin is required. Since the only safe way in which such a dose can be given is by dividing it into small fractions which are given twice or once a day, or every other day, this method of treating malignant tumors has been widely adopted and is applied almost indiscriminately to tumors of all kinds.

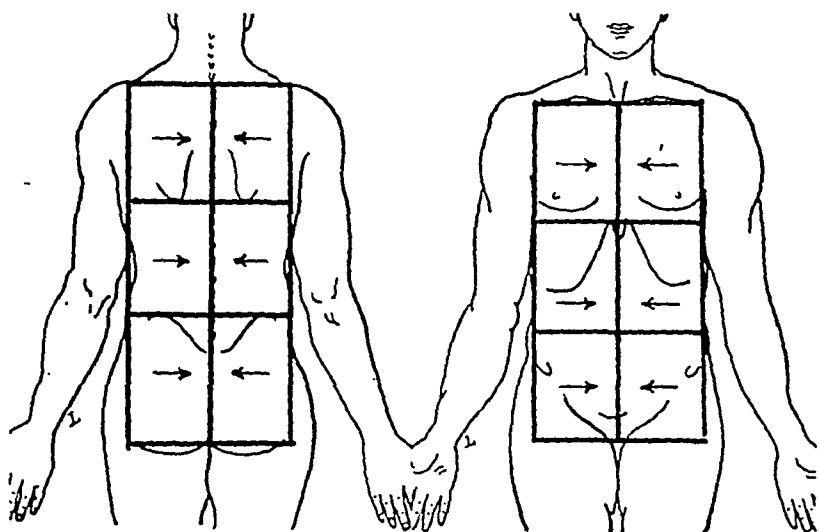


Fig. 7: Arrangement of fields when the mediastinal, retro-abdominal and iliac lymph nodes must all be treated.

Other factors which have influenced many to "standardize" treatment in this manner have been the trend toward greater and greater "depth doses" obtained by increasing voltage and filtration and the conception that the effect of the rays does not vary with the voltage, but only with the quantity (number of roentgens) delivered to the tumor.

But methods which may be entirely rational when employed in the treatment of epithelial neoplasms or of tumors which have an equal or greater resistance to roentgen rays may not be so effective when applied to tumors which are much more sensitive to the rays. I have already pointed out how extremely sensitive are lymphocytes, or lymphoid cells, in comparison with epithelial cells; this difference is so great that many physicians find it difficult to believe. A dose of 10 roentgens is sufficient to destroy a small proportion of lymphoid cells in a lymph node, and a dose of 100 roentgens causes greater destruction of these cells, whereas about 600 roentgens of rays generated at the same voltage are required to destroy a perceptible number of epithelial cells in the skin.

For many years, as far as treatment of Hodgkin's disease or lymphosarcoma is concerned, I have observed that rays generated at 200 kilovolts or more and filtered through 0.5, 0.75, 1.0 or 2.0 millimeters of copper (or through an equivalent thickness of zinc) are not as effective as is a corresponding dose of rays generated at 130 or 140 kilovolts and filtered through 4.0 or 6.0 millimeters of aluminum. Some years ago, comparative tests of treatment with rays produced at these two ranges of voltage gave results which were clearly in favor of the lower voltage, and subsequent experience has amply confirmed the results of those tests. How can this difference be explained? The only explanation I can think of is that, when the rays are generated at 200 kilovolts or more, a considerable proportion of the rays pass through the exposed region without being absorbed and, therefore, without producing any cellular effects, but when the rays are generated at moderate voltage (130 to 140 kilovolts), a larger proportion of them are absorbed by the cells in the exposed territory. In my experience, treatment at moderate voltage is more effective, both immediately and for the long run, than treatment at high voltage.

Quantity of rays: Because, in epithelial and other resistant tumors, effective destruction of the malignant cells requires the largest dose of rays which can be given with safety, it is widely assumed that the same is true of all malignant processes. When lymphoblastoma is limited to a single region, and especially when it is confined to a small cluster of nodes, the hope of permanent cure may reasonably be entertained and a complete result can

rarely be achieved, but this is never true when the pathologic process involves the mediastinal nodes or other thoracic structures. Under these circumstances, complete and permanent regression of the lymphoblastomatous lesions is practically out of the question; the most that can be expected is marked regression and prolonged remission. In most cases, therefore, the aim should be to obtain maximal improvement and to maintain this improvement as long as possible. This can seldom be achieved with rays generated at high voltage, with maximal doses given by the fractional method. To follow this course may yield excellent initial results, and treatment may be repeated at long intervals once or twice at most, but when the pathologic process again becomes active, as it inevitably does, further treatment is impossible or, if it is undertaken, it has little, if any, effect and the patient no longer can obtain relief.

Sometimes treatment is given with rays generated at high voltage (200 kilovolts or more), but the surface dose given to each field does not exceed 600 roentgens, and this dose is divided into daily fractions of 100 or 200 roentgens. This is more effective than the fractional method with a maximal total dose, but a still more effective method is to employ rays generated at 130 or 140 kilovolts and filtered through 6 millimeters of aluminum, and to give to each field a surface dose of 550 roentgens at one time (on one day); when the patient cannot tolerate 550 roentgens in one session, half of this dose may be given on one day and half the next. Then the other fields should be similarly treated in rotation and as rapidly as the patient's tolerance allows. Thus, when the chest alone requires treatment, the four fields (each receiving 550 roentgens) can usually be irradiated in four successive days. Irradiation of the chest seldom causes marked radiation sickness. But when, besides the chest, the upper half of the abdomen or the entire abdomen must also be treated, the course of treatment consumes much more time and may require from eight to sixteen days, according to the patient's tolerance.

As I have already indicated, a single course of treatment such as has been outlined, when given to a patient who had never been treated before, may be expected to cause the affected lymph nodes to retrogress from 25 to 100 per cent in three weeks. But even when the treatment is followed by what may appear to be 100 per cent regression, it is almost always wise to give a second course of similar treatment three weeks later, provided the number of leukocytes in the blood has not diminished too much. The reason for repeating the treatment is that it causes the regression and improvement to last much longer than would be likely to happen after a single course of treatment. In cases in which the initial

involvement is rather marked it is often wise to give three courses of treatment, but the interval between the second and third courses may be increased to five or six weeks.

Subsequently the patient should be examined at regular intervals; for the first year this may be once in three months, but, when signs of fresh activity of the pathologic process in the lymph nodes do not appear during this period, the intervals may be increased to four or even six months. Sometimes the improvement may continue for several weeks or several months, and sometimes it may continue for two, three or more years; this varies greatly in different cases and depends mainly on whether the patient is afflicted with Hodgkin's disease or lymphosarcoma in a relatively acute or subacute form, or whether the process has a relatively chronic form. If, when the patient is first seen and treated, the malignant condition has not advanced too much and is not too extensive, and if he is fortunate enough to have the chronic form, he may survive for several or even for many years. He will probably need treatment from time to time, but the affected lymph nodes will continue to respond well.

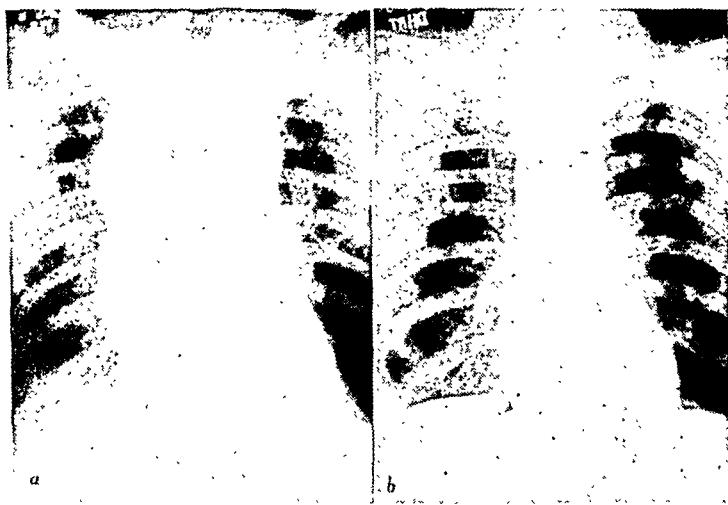


Fig. 8: Roentgenograms of thorax in case 4.

Fig. 8a: Roentgenogram made on September 24, 1930, showing marked enlargement of mediastinal nodes. The patient was a young man, twenty-six years of age, who had been ill only six months. The cervical nodes were greatly enlarged, and the face and neck were engorged and cyanotic from venous obstruction. The retro-abdominal, axillary and inguinal also were extensively involved. The patient was pale and weak but his weight had not diminished.—*Fig. 8b:* Roentgenogram made on October 1, 1930, after roentgen treatment each day for six days. It shows extremely rapid and marked regression of the affected mediastinal nodes. This indicates great instability of the lymphoid system; when the lymph nodes are involved as extensively as this and when they retrogress as rapidly as they did in this case, the patient seldom can be expected to live long. In this case the patient died eight months later,

When, as is sometimes done, treatment is given only once or twice a week, the patient does not improve as rapidly or as much as he should; and when the quantitative dose of rays given to each field, whether this is done at one time or by the fractional method, is excessive, the affected lymphoid structures rapidly become resistant to the rays, and thenceforth the treatment becomes less and less effective. When excessive doses are avoided, the affected structures continue to respond indefinitely. It is true that, as time goes on, especially in the chronic form of lymphoblastoma, some increase in resistance of the lymphoid cells develops, but this is slow. In most cases, gradual failure of lymphoblastomatous lesions to respond to irradiation is due to (1) an advanced stage or terminal phase of the pathologic process and (2) excessive quantitative doses of rays within a given time.

PROGNOSIS

Survival depends chiefly on the three following factors: (1) the relative acuteness or chronicity of the malignant lymphoid process; (2) the extent of involvement and the stage which the condition has reached when it is recognized and when treatment is started and (3) the thoroughness and care with which the treatment is planned and given. Of these three factors the first two are much more important than the third, and the first is more important than the second. It must not be inferred that treatment is of small consequence; it is true that, in the average case, its influence on survival is not as great as might be desired (Fig. 8), but there is no doubt that, when patients receive sound treatment, their condition is much better and their symptoms can be kept under partial or complete control for long periods.

In cases of relatively acute lymphoblastoma the pathologic process runs a comparatively short course, and the time which elapses between the apparent onset of the disease and the death of the patient may vary between six months and three years; fortunately, the number of cases in this group is small. By far the largest group consists of patients who are afflicted with these conditions in a relatively subacute form, in which the course of the process extends from three to six years (Fig. 9). In a considerable number of cases the patients have the chronic form, in which the malignant condition may continue from six to ten, fifteen or twenty years, or even longer.

SUMMARY

Each variety of normal cell has a specific range of sensitiveness to roentgen rays. The different varieties of normal cells are listed in the order of their sensitiveness. The action of roentgen rays on

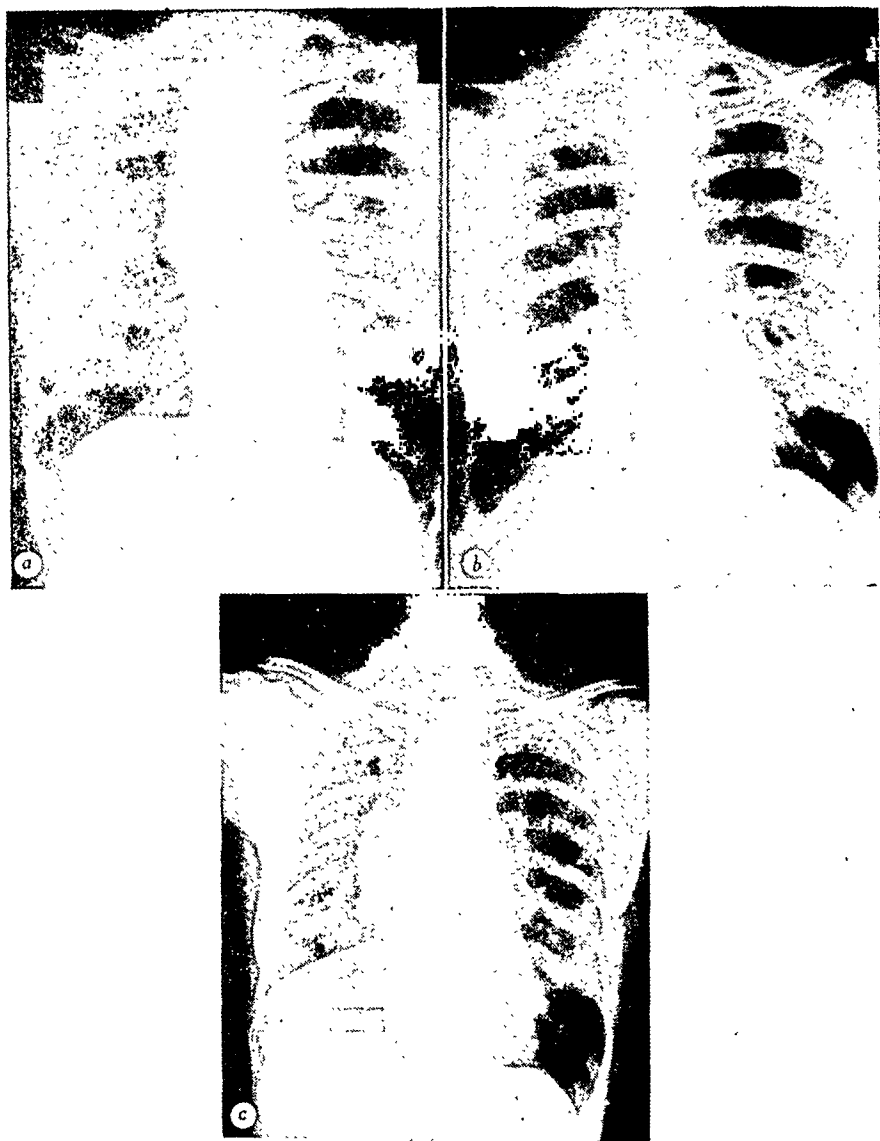


Fig. 9: Roentgenograms of the chest in case 5.

Fig. 9a: Roentgenogram made on July 29, 1921. It shows moderate enlargement of mediastinal nodes, principally on the right side. Besides this, some nodes in the neck, armpits and groins also were affected.—*Fig. 9b:* Roentgenogram made on September 28, 1921, after a course of roentgen treatment. It shows marked regression of the mediastinal nodes, and the cervical, axillary and inguinal nodes also had been correspondingly influenced by the treatment. Then the patient remained well and free from symptoms and lymphadenopathy until 1927.—*Fig. 9c:* Roentgenogram made on June 6, 1927. It shows fresh and considerable enlargement of mediastinal nodes. Roentgen treatment again caused these nodes to retrogress markedly. Then the patient was well until 1932 when weakness, pallor and gastro-intestinal symptoms developed and physical signs indicated probable involvement of retroperitoneal nodes. The cervical, axillary and inguinal nodes also had again enlarged. Roentgen treatment directed toward the upper two thirds of the abdomen and toward the chest was followed by substantial improvement

cells is briefly described, lymphocytes being used as an example. Then the sensitiveness of different kinds of tumors is mentioned, and stress is laid on the close correspondence in sensitiveness between tumors and the normal cells from which different kinds of tumors are derived. Knowledge of the relative sensitiveness of different tumors often permits one to distinguish some tumors from others, and this is as true of thoracic and intrathoracic tumors as it is of tumors in general.

The more common clinical and roentgenologic features of Hodgkin's disease or lymphosarcoma of the chest are reviewed. Then the treatment of these conditions is discussed with reference to the anatomic arrangement of the fields, the quality and quantity of the rays. Finally, the principal factors which govern prognosis are mentioned.

RESUMEN

Cada variedad de célula normal tiene una esfera específica de sensibilidad a los rayos de Roentgen. Se cataloga las diferentes variedades de células normales en el orden de su sensibilidad. Se describe brevemente la acción de los rayos de Roentgen sobre las células, usando los linfocitos como ejemplo. Se menciona después la sensibilidad de diferentes clases de tumores, y se hace hincapié sobre la íntima correspondencia en sensibilidad que existe entre los tumores y las células normales de las que se derivan diferentes clases de tumores. El conocimiento de la relativa sensibilidad de diferentes tumores frecuentemente nos permite distinguir unos tumores de otros, y esto es tan cierto en tumores torácicos e intratorácicos como lo es en tumores en general.

Se repasa los rasgos clínicos y roentgenológicos más comunes de la enfermedad de Hodgkin o linfosarcoma del pecho. Se discute después el tratamiento de estos estados con respecto de la disposición anatómica de los campos y la calidad y cantidad de los rayos. Finalmente, se menciona los principales factores que determinan el pronóstico.

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which continued until 1936 when fever and loss of weight developed. More treatment again caused marked improvement. In 1937 the return of fever, itching and edema required additional treatment, and this again yielded considerable improvement. Finally, in 1938, the lymphoblastomatous process again became active in the abdomen and elsewhere, but roentgen treatment yielded only slight and transient improvement and the patient died late in the same year.

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Length and Width Changes in the Pulmonary Arterial System of Rabbits in Passing from the Stage of Expiration to that of Collapse as Revealed by Roentgenography

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Macklin¹ has recently re-opened the discussion of functional length and width changes of the pulmonary vasculature in respiration, and has advanced the view that, particularly when ventilation is vigorous, these changes are marked in the arteries and veins. In passing from the inspiratory to the expiratory phase there is a decrease in the length and width of both arteries and veins, and there is a corresponding increase in going from expiration to inspiration. He finds that there is a periodic respiratory decrease and increase in the volume of the arteries and veins in expiration and inspiration respectively, and feels that this volumetric change, rhythmically repeated, has the effect of a pump which aids the heart. The idea of a thoracic pumping action is, of course, not new, but the histophysiological approach to the problem enables it to be seen in a new light. There is much discussion in the original paper which cannot be gone into here.

The length and width changes in the pulmonary blood vessels in passing from the expiratory phase to that of collapse are of much the same order as those above-mentioned in that they are motivated largely by the action of the perivascular sheaths of air sacs; and an opportunity to study them briefly by roentgenography has recently been afforded. It is hoped to expand the data bearing on this and allied subjects in the near future.

MATERIAL AND METHOD

Two rabbits of approximately equal weight, five and one-half pounds, were selected. They were anesthetized and some seven cubic centimeters of a solution of 1 per cent of potassium oxalate and 4 per cent of sodium nitrite in distilled water were injected into the flowing blood, following which the abdominal aorta was cut. In one animal, R22, the rest of the experiment was done with the chest unopened, but in the other, R26, the diaphragm was nicked and the subsequent procedures took place with the lung in a state of collapse. The inferior vena cava was cannulated and

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into it was injected a solution of .4 per cent sodium nitrite and .5 per cent sodium chloride in water at a pressure of 6 inches, for R22 and 10 inches for R26. In this way the vessels of the lungs were flushed out via the heart. Immediately thereafter, there was injected, through the same cannula, a radio-opaque latex or artificial rubber. The latex was made opaque by the addition of thorotrast (Heyden Chemical Corporation, New York), 10 per cent in the case of R22 and 20 per cent in R26. It was found easy to inject the latex by simple manual pressure on a syringe. Although a pressure indicator was not used, the feeling was that it was about the same in the two cases. Fixation of the latex *in situ* was accomplished by introducing a solution of 5 per cent glacial acetic acid in 95 per cent ethyl alcohol into the trachea by means of a cannula attached by rubber tubing to a small funnel in which the level of the alcohol was about 6 inches above the lung. Bubbles were evacuated by gentle squeezing of the chest, and the inflow allowed to proceed slowly overnight. When the lungs were removed next morning they were fairly stiff, and held their shape. They were immersed for a further period in 95 per cent alcohol.



Fig. 1: Print from a radiograph of the lungs of a rabbit (S86-R22) in a state of moderate inflation, corresponding roughly to expiration. The arteries contain radio-opaque latex.

The heart, oesophagus and other extraneous tissues were removed and the two lungs, held together by their vessels and bronchi, and with lobes spread out, were radiographed by Dr. Leila Howell of the Victoria Hospital, London, X-ray staff, at a distance of 36 inches tube to table.

The results showed that the main branches of the pulmonary arteries, and even subsidiary branches, were much shorter and narrower in R26, representing collapse, than were the corresponding vessels in R22, representing expiration. This is, of course, what would be expected; for one cannot view two lungs from animals of approximately equal size, of the same species, the one inflated and the other collapsed, without realizing that the blood vessels (as well as the air channels) must be shortened in collapse, and since narrowing so frequently goes with shortening it would be natural to suppose that the collapsed lung would show narrower vessels. The radiographs, as seen in the figures illustrate these changes very strikingly (Figs. 1 and 2).

DESCRIPTION OF THE FIGURES

Figure 1 is from a print of a radiograph of rabbit S86-R22 taken on August 23rd, 1945, and Figure 2 is from a print of a radiograph of another rabbit, S86-R26, of approximately the same weight,



Fig. 2: Print from a radiograph of the collapsed lungs of a rabbit, (S86-R26). The arteries contain radio-opaque latex, but those of the upper lobes are unfilled. The shortening and narrowing of the vessels which are embedded in collapsed lung tissue are apparent from a comparison with figure 1.

taken on August 26th, 1945. Figure 1 shows the moderately expanded condition, and Figure 2 the collapsed condition. By comparing the measurements of the main blood vessels in the two films, as made by dividers and a centimeter scale, the following data were obtained:

LENGTH CHANGES

Left main trunk; distance between extremities, direct	R22 — 55 mm.
Left main trunk; distance between extremities, direct	R26 — 39 mm.

Difference, representing the shortening in passing from moderate expansion to collapse	16 mm.
Expressed as a percentage this value would be	29%

Right main trunk; distance between extremities, direct	R22 — 60 mm.
Right main trunk; distance between extremities, direct	R26 — 36 mm.

Difference, representing the shortening in passing from moderate expansion to collapse	24 mm.
Expressed as a percentage this value would be	40%

Averaging the two sets of measurements we find that the shortening of the two main trunks is	34.8%
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WIDTH CHANGES

Left main trunk; width at the base	R22 — 3.5 mm.
Left main trunk; width at the base	R26 — 2.0 mm.

Difference, representing the narrowing in passing from moderate expansion to collapse	1.5 mm.
Expressed as a percentage this value would be	43%

Right main trunk; width at the base	R22 — 3.33 mm.
Right main trunk; width at the base	R26 — 2.33 mm.

Difference, representing the narrowing in passing from moderate expansion to collapse	1 mm
Expressed as a percentage this value would be	30%

Averaging the two sets of measurements we find that the narrowing of the two main trunks is	37%
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These data on one animal cannot, of course, be considered as final, but in the nature of a preliminary statement. The findings, however, do bring home to us with no little emphasis how intimately bound up with the lung tissues are the two vascular trees, arterial and venous; and how the collapse of the lung is directly felt by these blood vessels not only by length changes (shortening) but also by width changes (narrowing). We realize that in inflating the lung tissue there must be a widening and

The Lateral Projection of the Chest

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One of the most important fundamental principles in roentgenography is the making of two projections at right angles of any part of the body to be examined. This method gives one a true three dimensional study of the part under investigation. The advantages of this procedure in the analysis of any abnormal changes are self-evident and it was naturally adopted in practically all x-ray examinations. In addition to the above there was also introduced the principle of stereoscopy, known as stereoroentgenography, which consists in taking two pictures from slightly different positions. When these are placed in a stereoscopic apparatus one obtains the perception of objects in relief.

The stereoscopic method of examination has achieved great popularity among roentgenologists and was accepted wholeheartedly by physicians and surgeons to the extent that it is now considered to be almost an act of heterodoxy on the part of anyone who expresses doubt as to its value. Without entering into a full discussion of the merits or demerits of either method I will relate some facts in my own experience and will try to prove by several representative illustrations the superiority of the first method over the second in the great majority of chest examinations.

My first big opportunity to examine chests on a large scale was during the first World War. I found that stereoscopic views of the chest in the anteroposterior position alone added hardly any more information than that obtained from a single view. However, when the patient was examined fluoroscopically from every possible angle it was possible, in the presence of an abnormal shadow in the lung field, to determine more accurately its exact location, shape, size and relationship to the surrounding structures and its probable nature. It has also been found that some abnormal shadows are entirely obscured in the antero-posterior position because of their situation in the course of the cardiovascular shadow. These also are rendered accessible to sight in the oblique or lateral positions.

With the above experience before me the next logical step was to take roentgenograms in the lateral positions. Contrary to the general opinion, which is held by many roentgenologists, the technic is not difficult to acquire by the average technician. In my laboratory lateral views of the chest have been taken routinely

under all kinds of conditions by myself or my technicians with satisfactory results. The only necessary requisite is the application of common sense in x-ray technic. After twenty-five years, during which time the use of the lateral view of the chest was more or less ridiculed, it is indeed a great satisfaction to see that many more illustrations of the lateral view are found in the roentgen literature. This is obvious evidence that its value is finally being appreciated.

A number of cases have been chosen for a more or less detailed description illustrating lesions of the respiratory organs in the anterior and lateral positions. It is hoped that even a casual glance at the roentgenograms will convince any skeptically minded physician of the superior value of this technic in the study of chest affections.

Bronchiectasis usually involves the lower bronchial branches which are often obscured by the heart and diaphragm. The diaphragm, as will be recalled, is not on the same plane through its entire expansion, but gradually slopes down from before backwards and laterally, so that its posterior attachment is on a much lower level than the anterior. Under such conditions the lower region of the lung is more or less obscured when the chest is viewed in the anteroposterior direction, but when the same is observed laterally any changes affecting the pulmonary bases, bronchi, pleura and diaphragm may readily be seen.

CASE REPORTS

Case 1: The anterior view (Fig. 1A) shows nothing remarkable in the lung fields with the exception of calcified nodules in the hilar region. In the lateral view (Fig. 1B) there are noted several irregular dense shadows, some of which show horizontal fluid levels, located in the retrocardiac space above the posterior half of the diaphragm. The bronchial branches extending to the hilum are thickened. The diagnosis of bronchiectasis was later confirmed by the injection of lipiodol. The above recalls other cases of small pleuritic effusion and diaphragmatic pleurisies which were recognized in the lateral view although the anteroposterior view was apparently negative.

Calcified glands are frequently seen in the course of the trachea and bronchial tree in the anterior projection, but when they occupy a position within the boundaries of the cardiovascular shadow they usually escape notice. If this applies to such opaque shadows, it is even more true in the case of soft shadows when they happen to be in similar locations. It is quite obvious that their recognition is difficult and some other method must be used such as the lateral projection.

Case 2: The anterior view (Fig. 2A) show emphysematous lungs with a low diaphragm. No other abnormal changes are noted, however, in

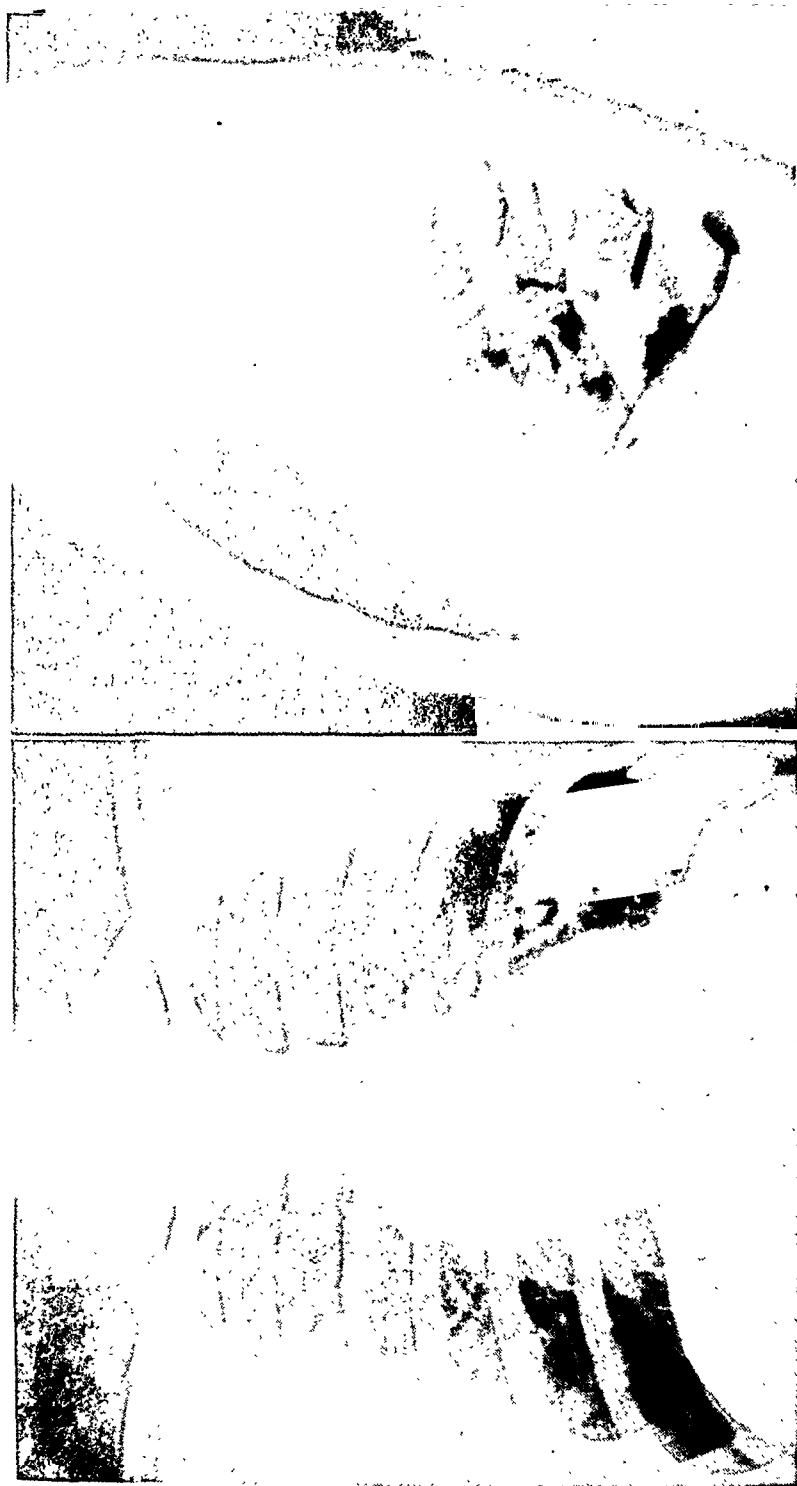


Figure 1A

Fig. 1A: Normal heart and lungs. Several calcified nodules in hilum. (Ant. View).—Fig. 1B: Horizontal fluid levels in several dense irregular shadows located behind heart and diaphragm due to bronchiectasis. (Lat. View).

Figure 1B

Fig. 1B: Horizontal fluid levels in several dense irregular shadows located behind heart and diaphragm due to bronchiectasis. (Lat. View).



Figure 2A

Figure 2B

Fig. 2A: Normal heart and great vessels with emphysematous lungs. (Ant. View).—Fig. 2B: Calcified glands along the course of the trachea and upper bronchi, not seen in the anterior view. (Lat. View).

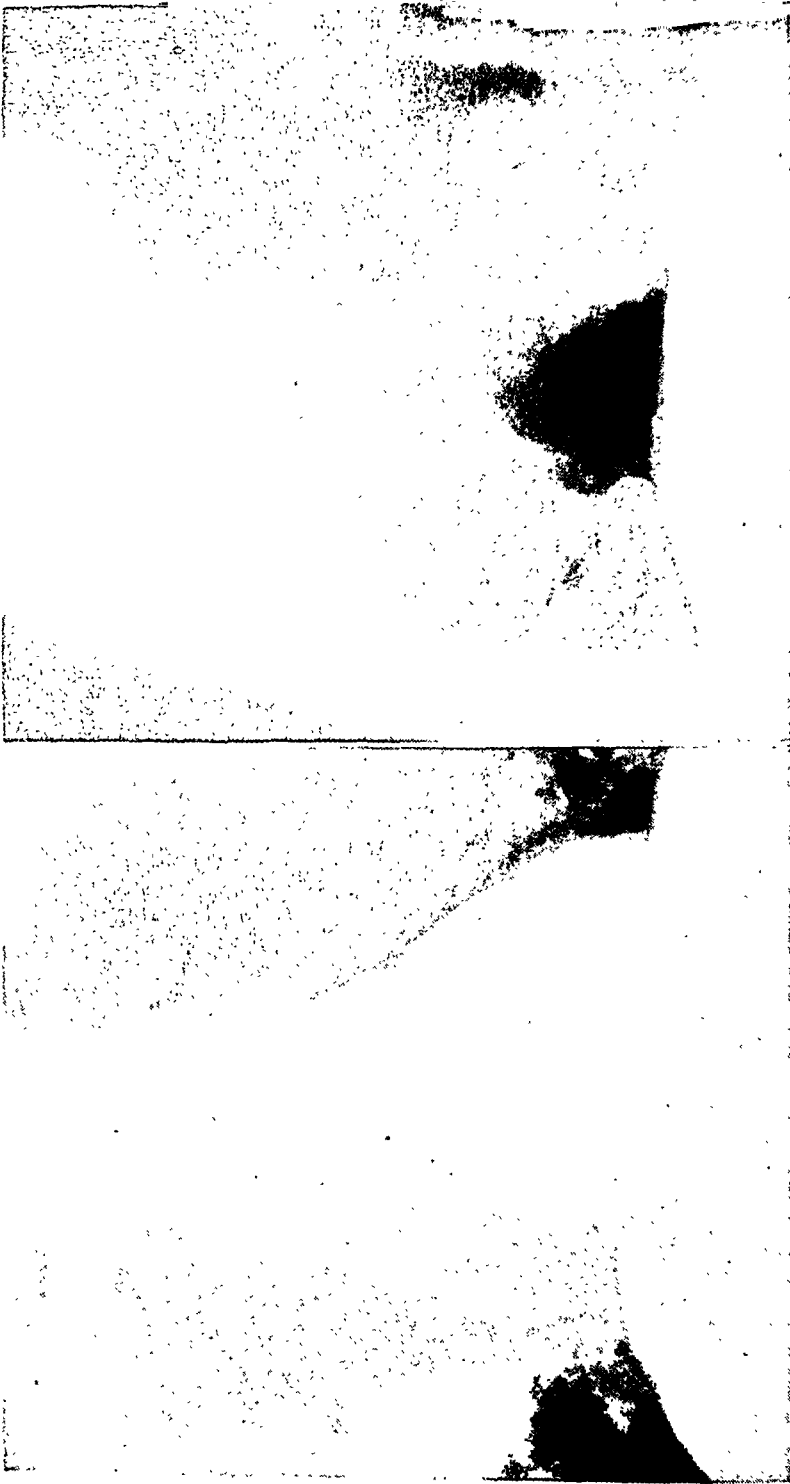


Figure 3A

Fig. 3A: Normal heart and great vessels. Lungs are clear. (Ant. View).—Fig. 3B: Metastatic tumor displacing the trachea forward which disappeared under x-ray treatment. (Lat. View).

Figure 3B



Figure 4A

Figure 4B

Fig. 4A: Consolidation of the right upper lobe due to pneumonia. (Ant. View).—Fig. 4B: Note the typical configuration of the right upper lobe with straight boundaries representing the oblique and horizontal interlobar fissures. (Lat. View).



Figure 5A

Figure 5B

Fig. 5A: Consolidation of the right upper lobe due to a pulmonary tumor. Its lower boundary is convex. (Ant. View).—*Fig. 5B:* The margins representing the interlobar fissures are convex giving the mass a globular shape. (Lat. View).

the lateral view (Fig. 2B). Several large calcified glands are seen in the course of the trachea and hilar regions.

Case 3: In the anterior view (Fig. 3A) nothing remarkable is noted about the cardiovascular or pulmonary structures, but in the lateral view (Fig. 3B) the trachea is displaced forward by a soft mass. In view of the history of an operation for teratoma testis the lesion was considered to be of metastatic nature and was treated accordingly with x-ray. This resulted in complete disappearance of the nodule with restoration of the trachea to its normal position.

As a rule, the x-ray diagnosis of lobar pneumonia is not difficult to make even on a single anterior view; however, at times a pulmonary tumor or pleurisy with effusion may simulate in its appearance the shadow of a consolidated lobe. The differentiation depends upon the configuration of the shadow. In case the shadow is due to a consolidated lobe its shape will conform both in the anteroposterior and lateral views to the anatomical lobe. In case of a tumor the shadow assumes a globular or irregular appearance and in pleurisy with effusion it is variable.

Case 4: The anterior view (Fig. 4A) shows a uniform dense shadow in the region of the right upper lobe. The lower boundary is sharply defined and corresponds to the horizontal fissure between the upper and middle lobe. In the lateral view (Fig. 4B) the shadow is bounded posteriorly by the oblique interlobar fissure between the upper lobe and apex of the lower lobe. Below and anteriorly it is bounded by the horizontal fissure. The configuration of the shadow both in the anterior and lateral views corresponds exactly to the shape of the upper lobe. Hence the lesion is due to a pneumonic consolidation.

Case 5: The anterior view (Fig. 5A) shows a dense uniform shadow in the region of the right upper lobe. The lower boundary of the shadow is somewhat convex. In the lateral view (Fig. 5B) the lower and posterior boundaries are also more or less convex instead of being straight as in the previous case. Because of the general globular outline of the shadow the diagnosis of a pulmonary tumor was made and was proven to be correct.

Case 6: The anterior view (Fig. 6A) presents a dense shadow in the region of the middle lobe. The upper margin is sharply defined and corresponds to the horizontal fissure between the upper and middle lobes. In the lateral view (Fig. 6B) the dense shadow is triangular in shape, of uniform density and overlaps the heart shadow. The upper horizontal margin corresponds to the interlobar fissure between the upper and middle lobes. The lower margin is oblique and corresponds to the interlobar fissure between the middle and lower lobes. The anterior vertical margin is parallel to the anterior chest wall. The configuration of the shadow both in the anterior and lateral views corresponds to the shape of the middle lobe and is, as a rule, only found in pneumonic consolidation. If stereoscopy would do what some think it can do one should see the triangular shadow of the consolidated lobe in the anteroposterior position but in actual experience this is found to be impossible.

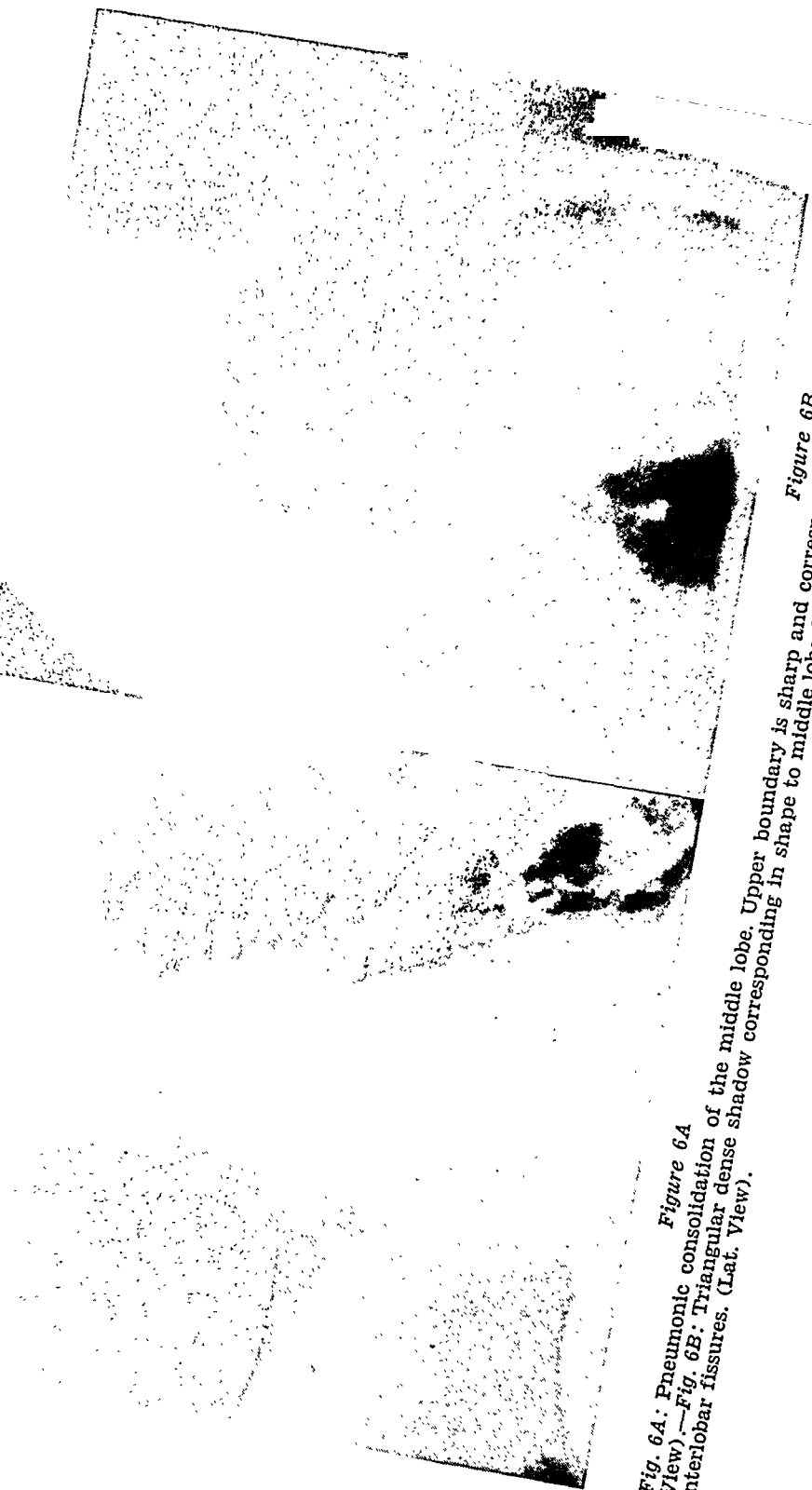


Figure 6A
Fig. 6A: Pneumonic consolidation of the middle lobe. Upper boundary is sharp and corresponds to the horizontal fissure. (Ant. View). — Fig. 6B: Triangular dense shadow corresponding in shape to middle lobe. The boundaries are the horizontal and oblique interlobar fissures. (Lat. View).

Figure 6B
The boundaries are the horizontal and oblique

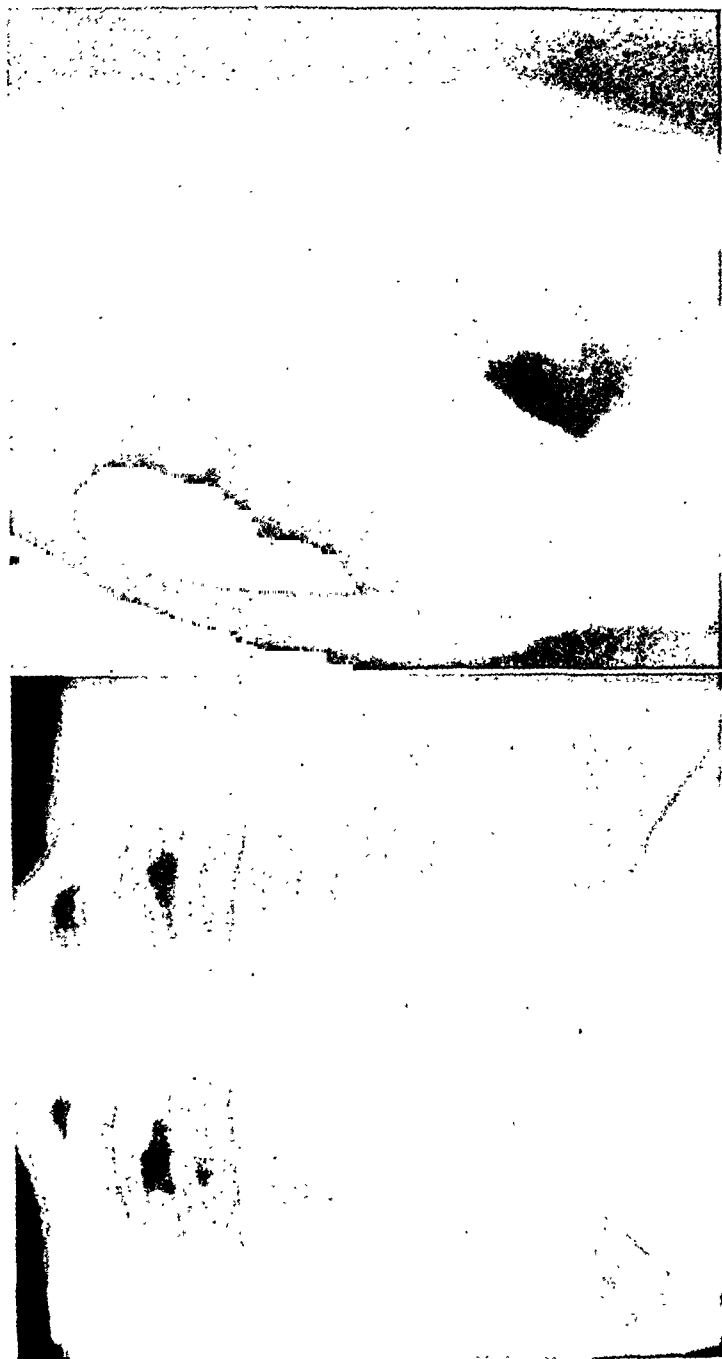
*Figure 7A**Figure 7B*

Fig. 7A: Dense shadow in region of middle lobe. Upper boundary is poorly defined. (Ant. View).—*Fig. 7B:* The dense shadow is oval-shaped and is in the course of the interlobar fissure between middle and lower lobes due to an interlobar pleurisy. (Lat. View).



Figure 8A

Figure 8B

Fig. 8A: A dense irregular shadow in the region of the right hilum. (Ant. View) —Fig. 8B: The dense shadow is located anteriorly along the course of the horizontal fissure due to a pleuro-pulmonary lesion.

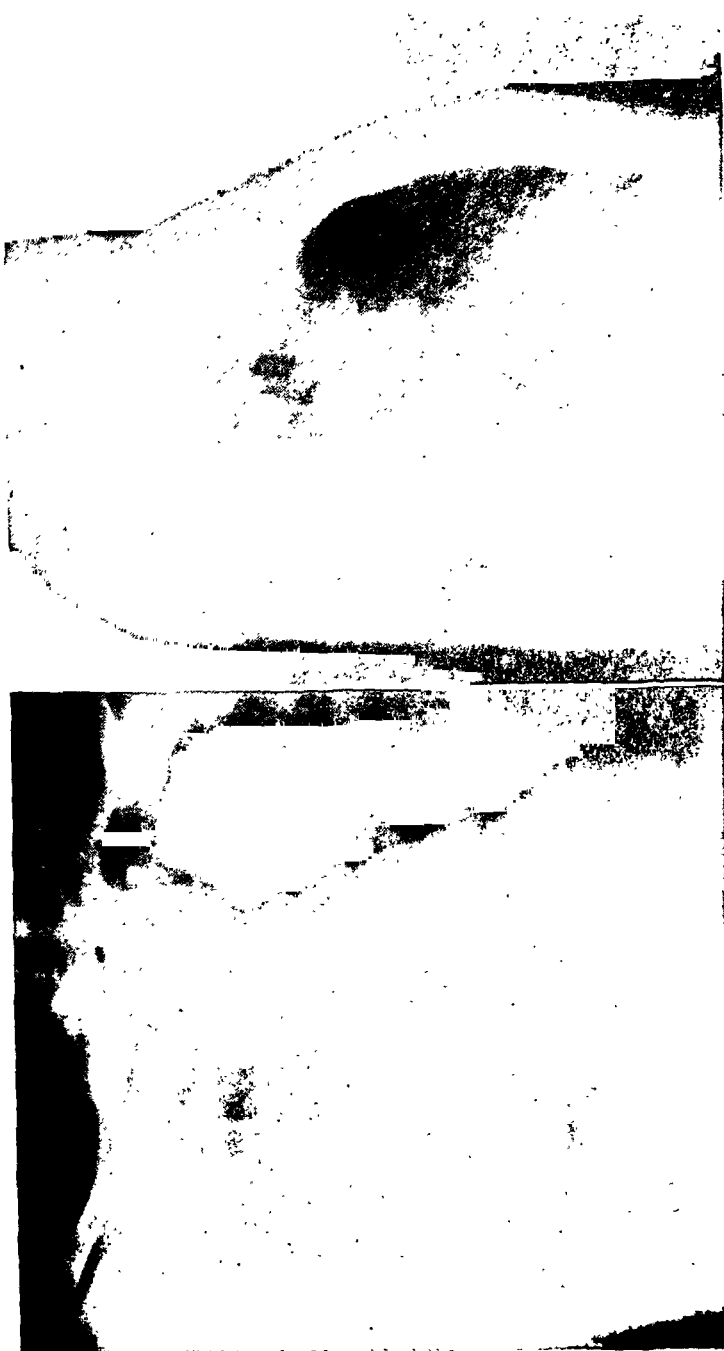
*Figure 9A**Figure 9B*

Fig. 9A: Circumscribed oval shaped shadow on the right of the heart and great vessels (Ant. View).—*Fig. 9B:* The shadow is located posteriorly on the right side of spine due to an encapsulated empyema. (Lat. View).

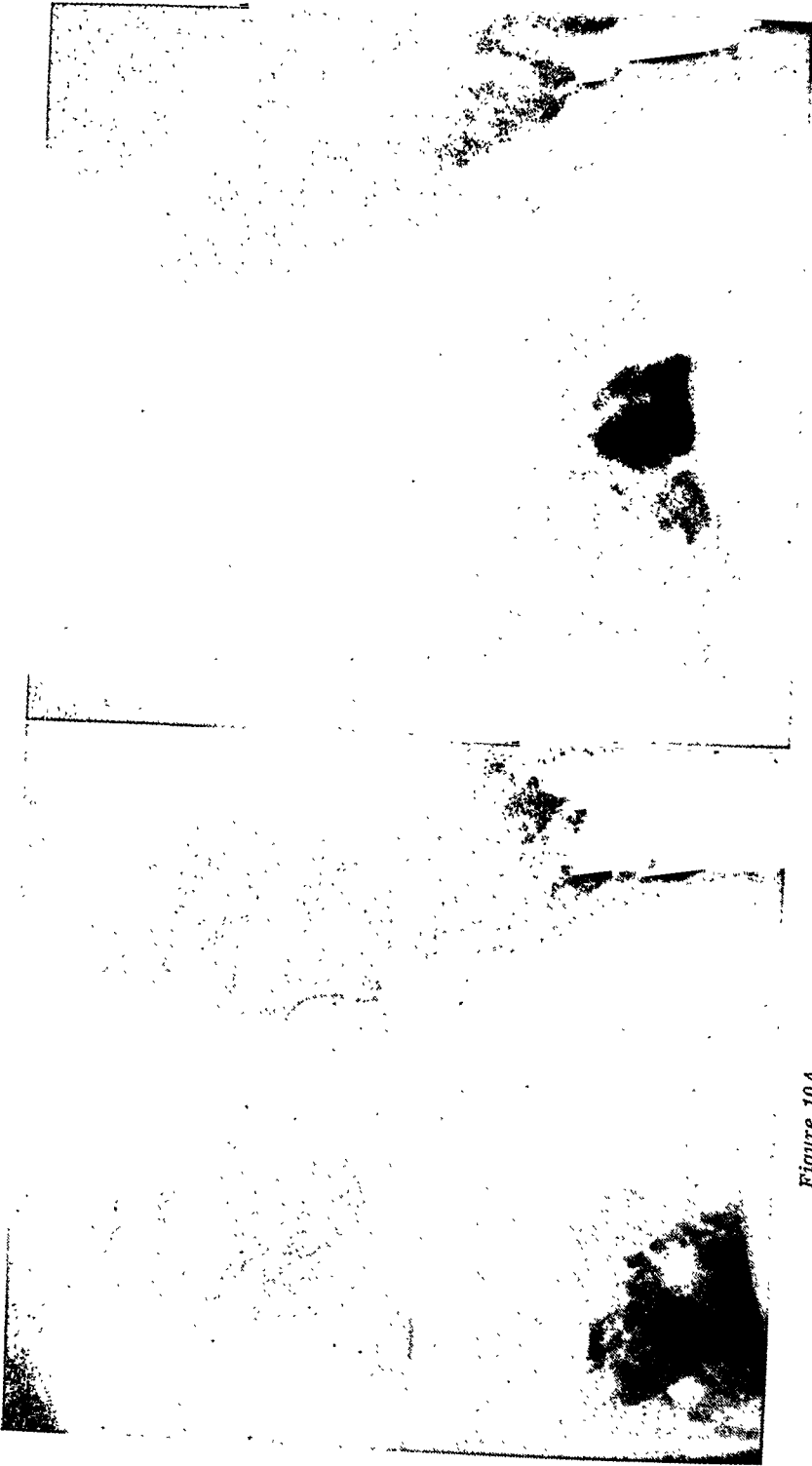


Figure 10A

Figure 10B

Fig. 10A: Circumscribed dense shadow with fluid level in right lung thought to be due to an abscess. (Ant. View) — Fig. 10B: The dense shadow is located in the course of the oblique interlobar fissure and is due to an encapsulated empyema. (Lat. View).

Case 7: The anterior view (Fig. 7A) shows a dense shadow in the region of the middle lobe. In the lateral view (Fig. 7B) the dense shadow is oval shaped and is located along the oblique interlobar fissure between the lower and middle lobes. Its configuration is not that of the middle lobe but is due to a collection of fluid between the lobes due to an interlobar pleurisy.

Case 8: The anterior view (Fig. 8A) is of special interest because it was misinterpreted by many stereoscopic enthusiasts who thought that the dense shadow on the right side originated from the hilum. They were very much dismayed to see the lateral view (Fig. 7B) which showed the shadow located anteriorly adjacent to the horizontal interlobar fissure. Apparently it was due to a pneumo-pleuritic lesion.

The accurate location of an encapsulated empyema is absolutely essential for obvious reasons. The most satisfactory method is by means of the anteroposterior and lateral positions.

Case 9: The anterior view (Fig. 9A) shows an oval shaped shadow of uniform consistence in the right lung field along the right cardiovascular border. The patient recovered from a pneumonia but soon afterwards developed symptoms suggestive of an abscess or empyema. Stereoscopic views in the anterior position were taken elsewhere but in spite of these they were unable to determine the exact location or the true nature of the shadow. On fluoroscopic examination the patient was turned on the side and in a moment it was quite evident to everyone present that the shadow was located posteriorly and was related to the interlobar fissure as shown in the lateral view (Fig. 9B). The diagnosis of an encapsulated empyema was confirmed by operation.

Case 10: The anterior view (Fig. 10A) shows a circumscribed dense shadow with a horizontal fluid level in the right lung. It was considered to be a pulmonary abscess because of the fluid level. In the lateral view (Fig. 10B) the shadow lies along the course of the oblique interlobar fissure and is sharply defined. The interlobar fissure below the shadow is thickened and apparently adherent preventing the fluid from extending toward the base. The air within the shadow was undoubtedly due to attempts at aspiration of the fluid. The immediate recovery after operation fully confirmed the fact that the lesion was due to an encapsulated empyema rather than a pulmonary abscess.

The importance of correct localization of pulmonary abscesses is just as valid as in the case of encapsulated empyema and its accomplishment is attained in the same manner.

Case 11: The anterior view (Fig. 11A) shows a dense shadow with a fluid level in the region of the middle lobe. In the lateral view (Fig. 11B) the shadow of the abscess is located just behind the anterior chest wall and to the right of the sternum. It would seem that the localization of the abscess ought to have satisfied any surgeon, but to my surprise a request was made for stereoscopic views in the anterior position. These were made but in spite of them the surgeon could not find the abscess. The reason, as I found out later, was due to the fact that the incision was made at the periphery of the chest instead of medially near the sternum where the abscess was shown to be located. I am still puzzled

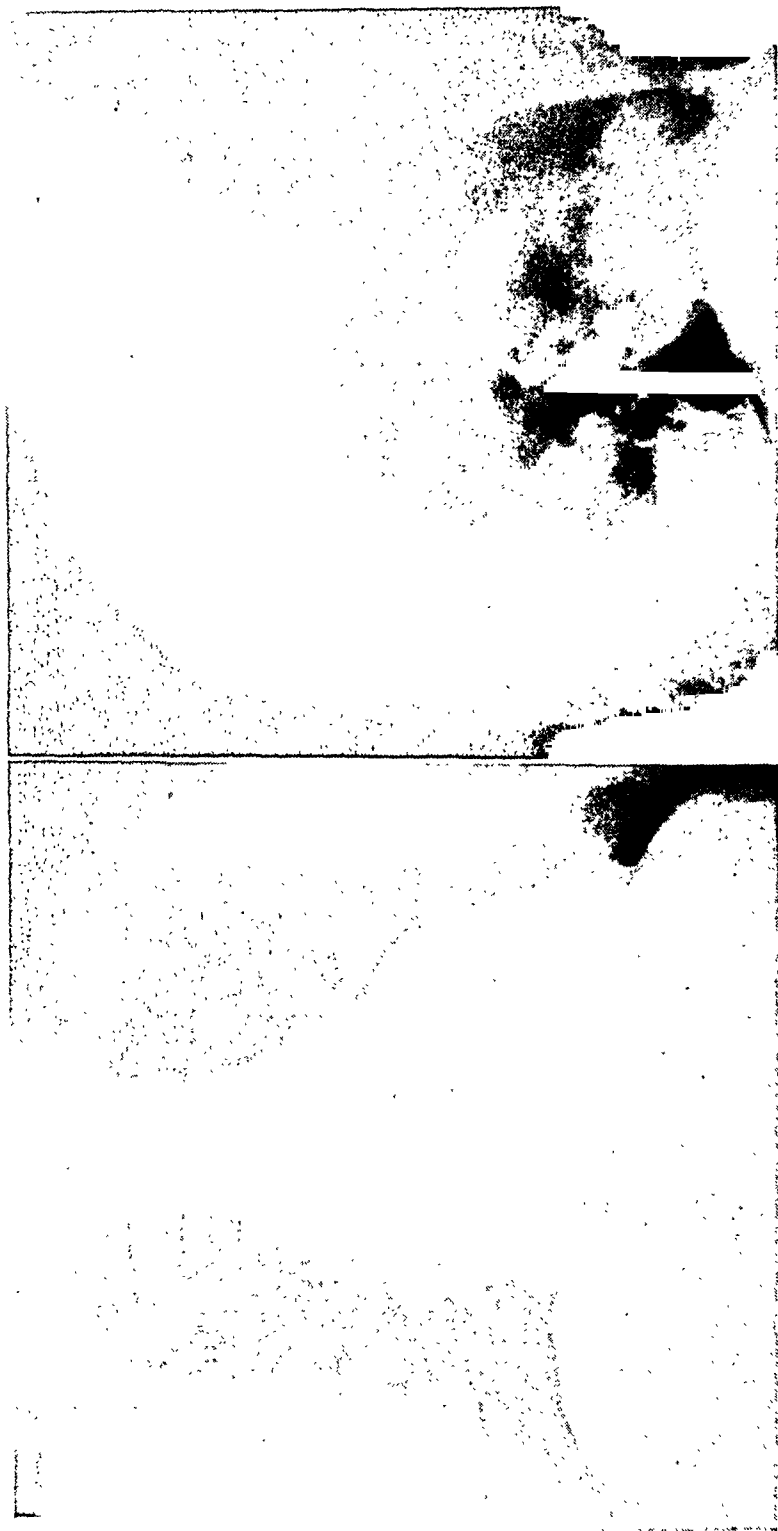


Figure 13A

Figure 13B

Fig. 13A: Dense shadow along the left cardiac border, the nature of which is uncertain. (Ant. View).—Fig. 13B: Dense shadow with fluid level located to the left of spine and obscured completely by the heart. (Lat. View).

as to why the surgeon got such a wrong impression from the stereoscopic views when the true location was so evident. When attention was again called to the exact location, the operation proceeded without interruption and terminated successfully.

Case 12: The anterior view (Fig. 12A) shows a circumscribed dense shadow with a fluid level due to a pulmonary abscess. It is located, as in the previous case, in the region of the middle lobe, but in the lateral view (Fig. 12B) the shadow is seen to be located posteriorly on the right side of the spine in the lower lobe.

Case 13: The anterior view (Fig. 13A) shows nothing unusual except a dense narrow shadow along the left border of the heart, the nature of this is uncertain. In the lateral view (Fig. 13B) a dense shadow with a fluid level is seen overlapping the spine and is due to an abscess in the left lower lobe. It was completely obscured by the heart shadow.

The diagnosis of pulmonary tumors is, generally speaking, not difficult; however, as mentioned before, when they are entirely obscured by the cardiovascular shadow, a lateral projection is necessary. Even when located in the lung field their exact localization is essential for a more accurate diagnosis so again the lateral view is necessary.

Case 14: In the anterior view (Fig. 14A) a dense circumscribed shadow is seen in the region of the right upper lobe which appears to involve most of the lobe, but in the lateral position (Fig. 14B) the shadow is located posteriorly and involved only the posterior one-third of the parenchyma.

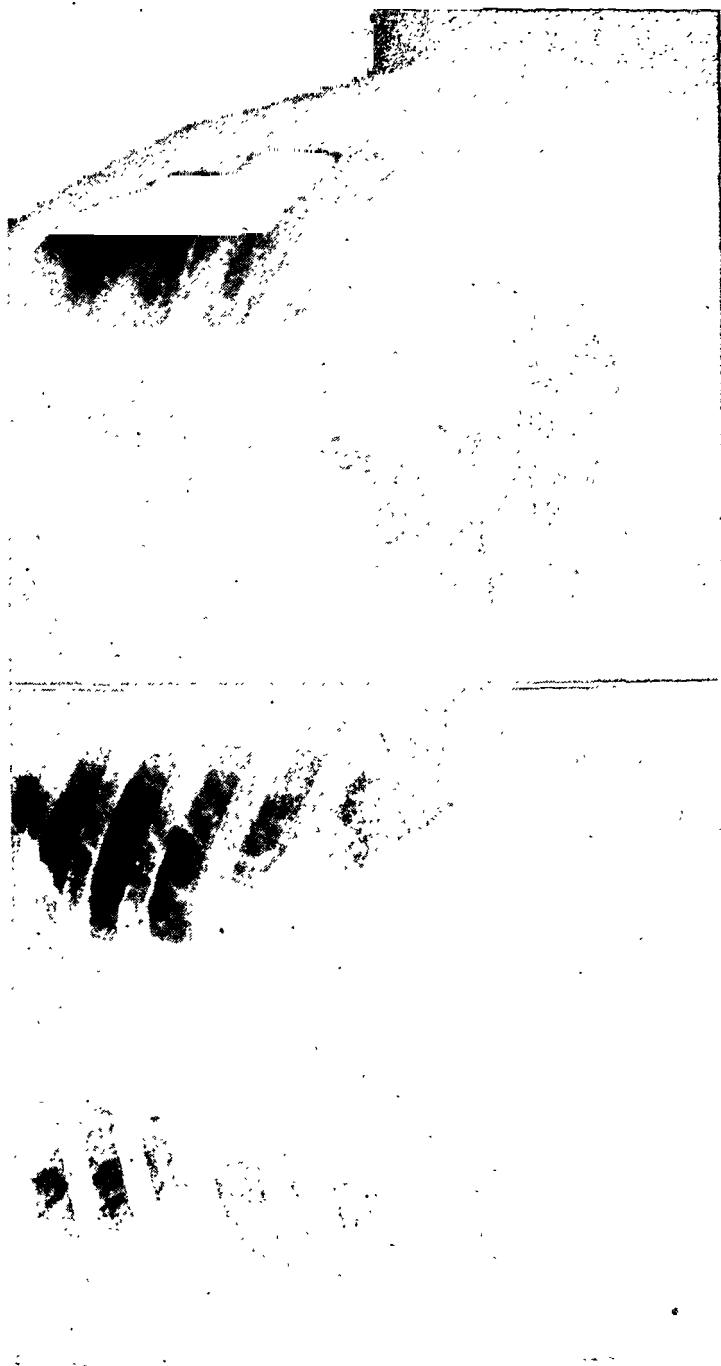
Case 15: The anterior view (Fig. 15A) shows a small nodule above the left diaphragm and to the left of the cardiac border. In the lateral view (Fig. 15B) the shadow is located in the mid-axillary line in the left lower lobe and is adherent to the diaphragm. Above there are noted dense striae extending to the hilum. With a knowledge of the exact location of the tumor it was possible to do an aspiration biopsy which proved the malignancy of the nodule. On operation the hilar region was found to be involved and it was considered to be inoperable.

Case 16: The anterior view (Fig. 16A) shows an area of greater density in the region of the right cardiophrenic angle. The outline of the diaphragm is more or less obscured by the shadow. In the lateral view (Fig. 16B) the dense shadow appears to be limited to the anterior portion of the lower lobe. Above, the shadow extends to the hilum. The diagnosis of a new growth was confirmed by operation at which time it was found to be inoperable.

I find no special advantage in taking a lateral view of an early or moderately advanced pulmonary tuberculosis. The superposition of the lungs more or less obscures the parenchymatous changes, but in advanced cases it was found that the lateral view often gives more accurate information of the state of the pathological process. It also often helps to determine the exact lobe or lobes which are involved.



Figure 14A
Fig. 14A: Dense circumscribed shadow in the right upper lobe due to a tumor. (Ant. View).—*Fig. 14B:* The tumor involves the posterior portion of the upper lobe. (Lat. View).



• Figure 15A

Figure 15B

Fig. 15A: Dense shadow at the base of left lung due to a tumor. (Ant. View).—Fig. 15B: The tumor is located in the middle of thorax and is adherent to diaphragm extending also to hilum (Lat. View).



Figure 16A

Figure 16B

Fig. 16A: Dense shadow in the region of the cardio-phrenic angle on the right side due to a tumor. (Ant. View) — Fig. 16B: The tumor involves the anterior portion of lower lobe being sharply separated from the upper lobe by the oblique fissure. (Lat. View).

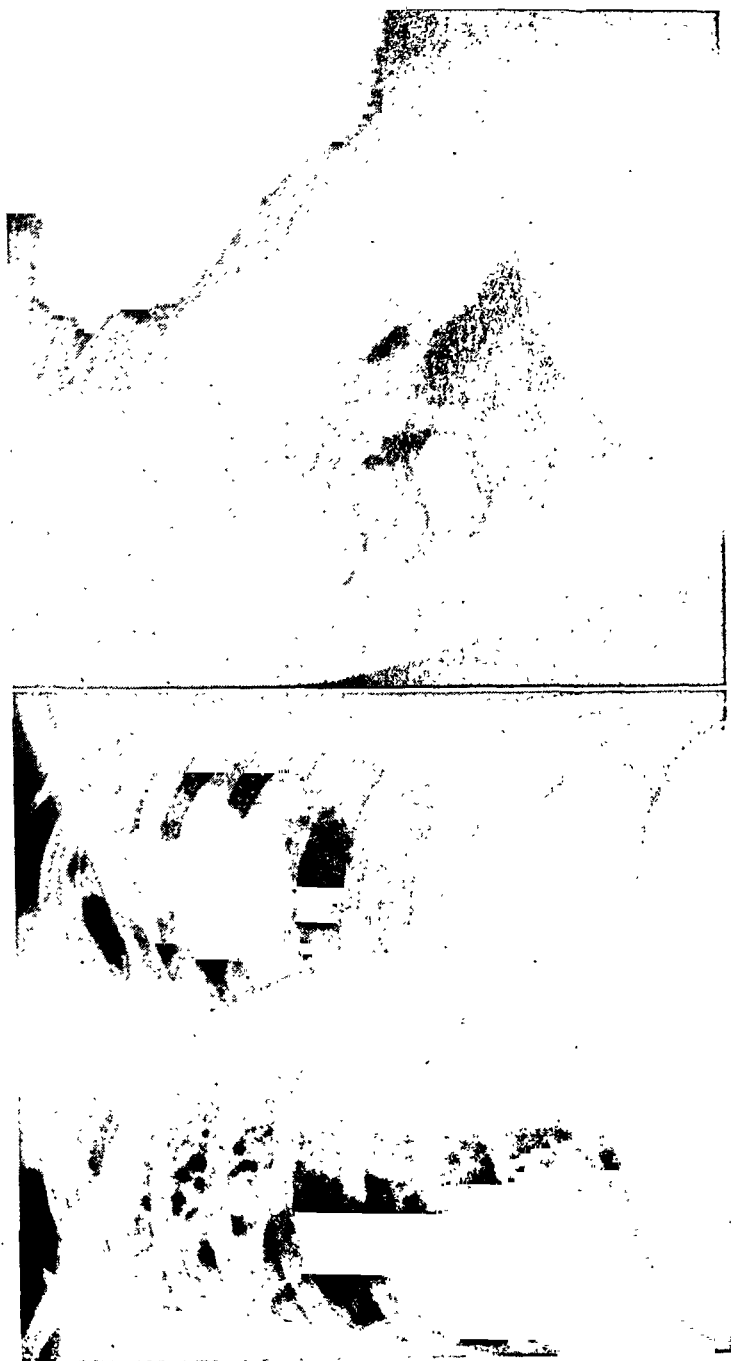


Figure 17A

Figure 17B

Fig. 17A: Pulmonary tuberculosis of the right upper lobe and apparently the left lower lobe. (Ant. View).—*Fig. 17B:* The lower lobes of each lung are clear. The lower segment of the left upper lobe is involved. (Lat. View).

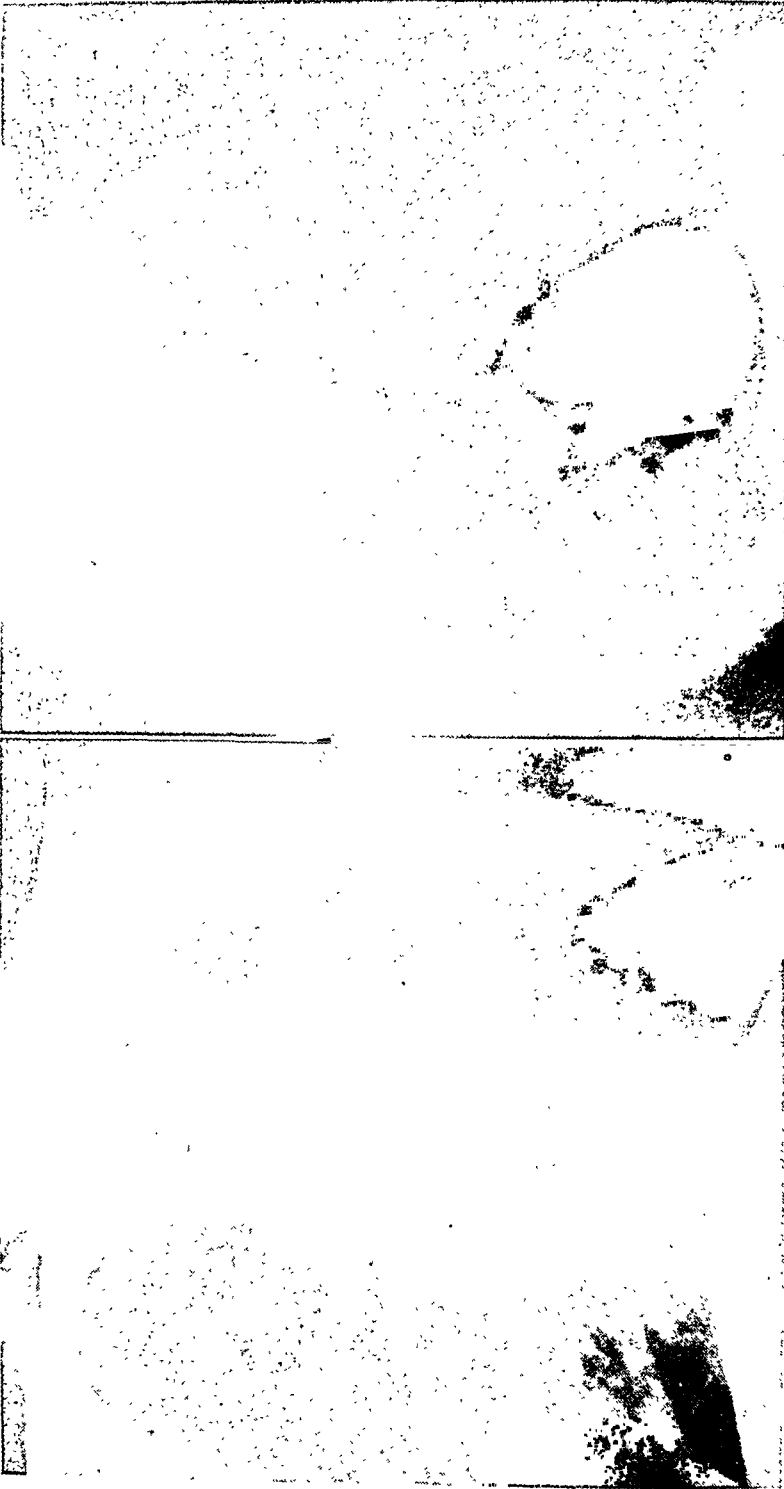


Figure 18A
Figure 18B
Fig. 18A: The left upper lobe shows a tuberculous process. The great vessels are displaced to the left. (Ant. View).—Fig. 18B: The oblique interlobar fissure is displaced forward on account of atelectasis of the upper lobe. The lower lobe is emphysematous. (Lat. View).

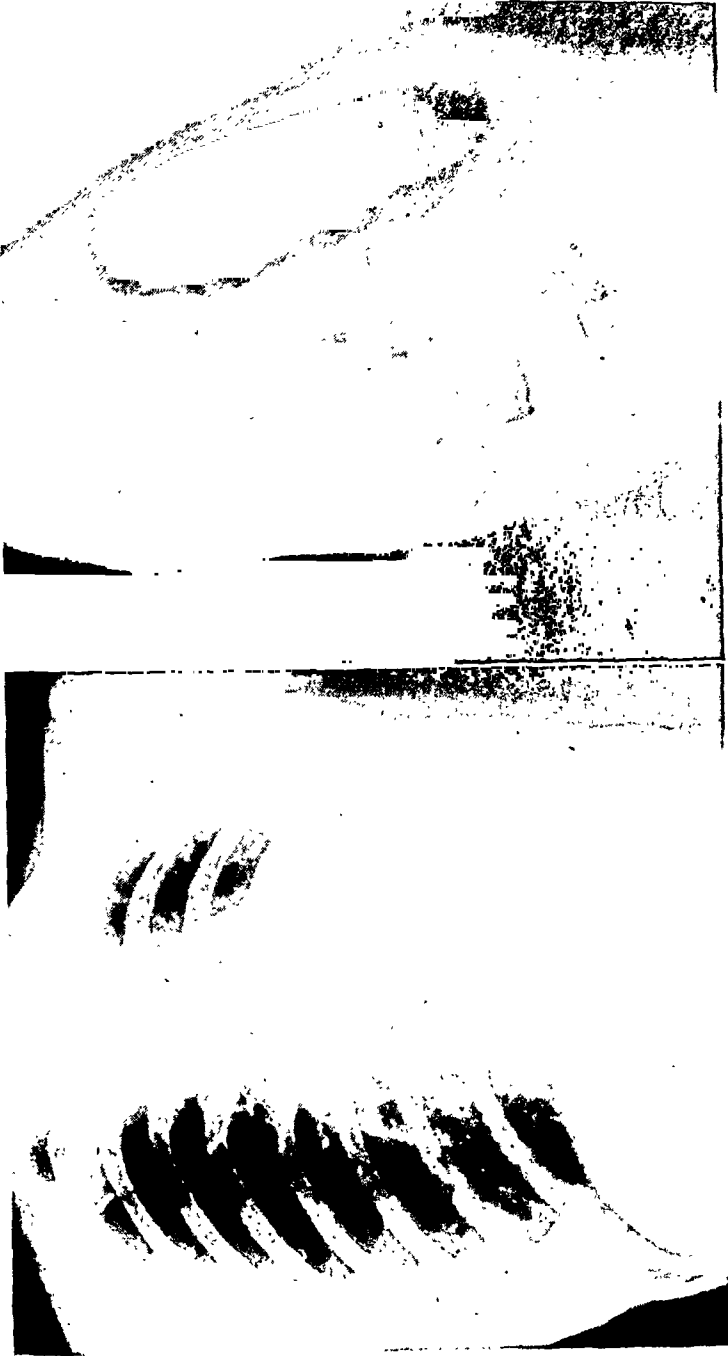


Figure 19A
Fig. 19A: The middle mediastinal structures are displaced to left due to atelectasis of the left lower lobe. (Ant. View).—*Fig. 19B:* The heart and vessels are also displaced backward due to atelectasis of the lower lobe, while the upper lobe is markedly emphysematous and occupies the entire retro-sternal space. (Lat. View).

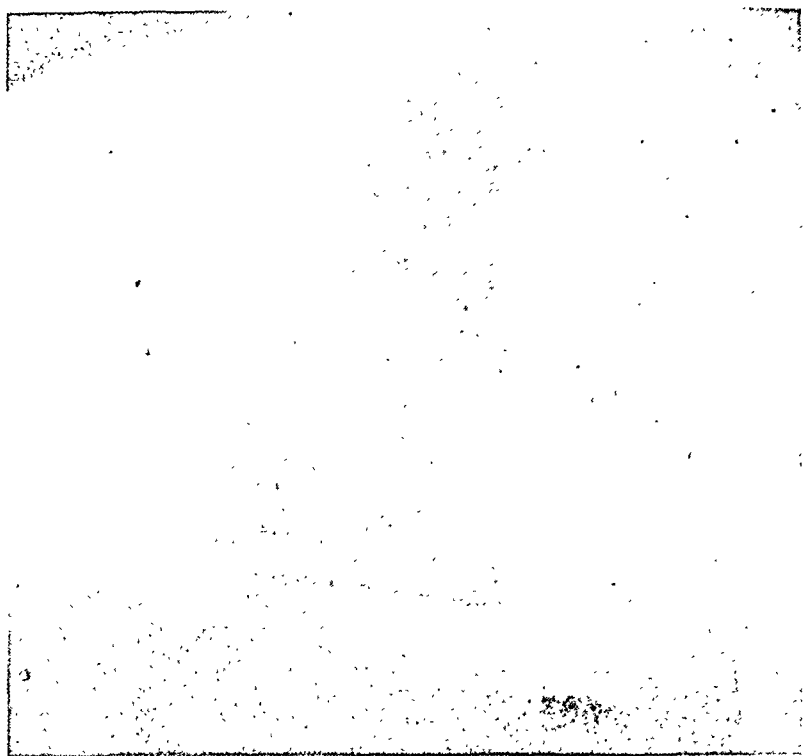


Figure 21A

Figure 21B

Fig. 21A: Right diaphragm is elevated and its excursions are limited. (Ant. View).—Fig. 21B: The posterior costo-phrenic angle is obliterated. The diaphragm is flattened. This is frequently found in subphrenic abscess. (Lat. View).

CONCLUSION

The application or use of anterior and lateral projections in the study of the chest in many thousands of cases has convinced me that its value is of no less importance than in the examination of an extremity for a possible fracture or dislocation. By their use one obtains a more accurate knowledge of the position, shape, size and relationship of abnormal shadows than is ever possible by stereoscopy taken in one direction alone. The information thus obtained leads one to a more accurate diagnosis which is the goal of every examination.

CONCLUSION

La aplicación o el uso de las proyecciones anteriores y laterales en el estudio del tórax en muchos miles de casos me ha convencido de que su valor es de tanta importancia como en el examen de una extremidad por una posible fractura o dislocación. Mediante su uso se obtiene una idea más exacta de la posición, forma, tamaño y relación de las sombras anormales que lo que es posible obtener con la estereoscopia tomada en una sola dirección. La información así obtenida nos conduce al diagnóstico más exacto, que es el objeto de todo examen.

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Clinical Value of Angiocardiography*

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Filling of the heart chambers and great vessels with contrast substance reveals their anatomical structure, and permits differentiation of vascular from non-vascular mediastinal lesions. The method, contrast substance used, and procedure, have been described. Angiocardiography has revealed that our knowledge of the position of the heart chambers and the border-forming structures of the cardiac silhouette in the normal and abnormal was not in complete accord with text book descriptions. This type of examination allows a demonstration of (1) congenital anomalies, (2) anatomical variations, (3) chamber enlargement, cardiac hypertrophy, or both, (4) constricted and expanded cardio-vascular lesions, and (5) the differentiation of the vascular from the non-vascular mediastinal lesions.

The following cases illustrate cardio-vascular lesions:

Case 1. E. H., a white female, aged 93, was admitted to this hospital on 4/25 41, and died on 5/14/42. A history was unobtainable, because of patient's poor memory, but she claimed "she did not have a care in the world, and never felt better in her life." She was transferred from another hospital with a diagnosis of a Pott's fracture of the ankle, and for custodial care.

Physical examination revealed a slight, aged, white female, poorly nourished and developed. Her pupils reacted to light and accommodation. Ears, nose and throat showed no abnormality. Examination of the chest showed shallow lung excursion, distant breath sounds, and no rales. Her heart sounds were distant and of poor quality. A₂ was accentuated. Pulse rate was 72, blood pressure 92/100. Her abdomen was essentially negative. Her extremities showed slight pretibial edema, and her right ankle showed evidence of a recent Pott's fracture. There was no deformity of either ankle or foot. Vessels were not palpable in either foot.

Laboratory work revealed a blood sugar of 82.5 mgm.%; blood urea nitrogen 29.4 mgm.%; Wassermann was negative; Kline doubtful.

The patient received custodial care and physiotherapy, and her course was uneventful until April 20, 1942, when she had a moderate hemoptysis. Examination of the chest at this time was essentially negative, except for moist rales in both bases, posteriorly. Later the same day, she began to bring up copious quantities of bright red frothy blood. It was decided that the patient was probably bleeding from an open vessel from the pharynx or tracheo-bronchial tree. A nose and throat consultation showed no pathology or bleeding vessel.

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**Roentgenologist, Goldwater Memorial Hospital.

On April 21, 1942, a roentgenographic examination of the chest revealed a large circumscribed area of absent aeration in the central portion of the left lung, which extended from the axillary portion of the chest to the hilum, merging with the mediastinal structures. In the lateral projection, the circumscribed area of absent aeration was superimposed over the heart and the superior mediastinum. While an aneurysm could not be excluded, the area of diminished aeration was thought to be an encapsulated effusion.

Clinically, it was thought that the mass in the chest might be a dissecting aneurysm or mediastinal tumor, though most likely an effusion. On April 24, 1942, a chest tap was performed, and blood appeared in the syringe, under considerable pressure. A specimen showed no neoplastic cells, revealed a red blood count of 3.6, Hgb 56%, white blood count of 11,000 and a negative culture. On April 25, 1942, an aneurysmal dilatation of the abdominal aorta was palpated, just above the umbilicus, which was tender. A film of the chest on May 5, 1942, showed no change when compared with the previous examination. Because of the history, a diagnosis of an aneurysm was made. It was decided to make angiocardio-graphic studies. On May 11, 1942, these studies were performed without any after effects, and revealed the following:

Angiocardio-graphic examination (Fig. 1) was made in the supine position, with contrast substance injected into the left external jugular vein. At the end of 4 seconds, contrast substance was visualized in the entire right heart, pulmonary aorta, right and left pulmonary arteries. Contrast substance was also visualized in the left jugular vein, collateral circulation in the neck, left subclavian and superior vena cava. The cardiac silhouette was very small. The contrast substance in the right heart was relatively large.

At the end of 12 seconds, contrast substance was distributed throughout the entire thoracic portion of the aorta and the left heart. The ascending portion of the aorta was tortuous. The descending portion showed a large aneurysm at the left lateral aspect of the aorta; the aneurysm extended from the 6th to the 9th rib. The contrast substance in the aneurysm did not fill the entire opacity in the left hemithorax. The outline of the contrast substance warranted the description of saccular. The appearance, however, was not truly saccular. Lateral to the opacified portion of the aneurysm was a thick clot. Because of the age of the patient, and the clinical history, this was considered as an arteriosclerotic aneurysm.

Contrast substance was demonstrated in the abdominal aorta down to the bifurcation and in the iliac vessels. The right kidney was unusually small. The vessels to the right kidney in the region of the hilum were visualized. Other abdominal vessels were also visualized. There were no evidences of an aneurysm of the abdominal aorta.

On May 13, 1942, the pulse and blood pressure were unobtainable in the afternoon, and patient was non-responsive. Later, the abdominal aorta was palpable and pulsating. Systolic pressure was 120. The chest was clear, but the outlook grave. Patient expired at 11:45 p. m.

Post-mortem examination by Dr. M. Bevans revealed the following:

The right lung presented no specific abnormalities. The posterior aspect of the left lung was firmly adherent to and invaded by a large aneurysm of the descending aorta. Dissection of the bronchi failed to reveal any communication between the aneurysm and the bronchi. The

there were no rales or ronchi. There was a "sensation" of a thrill in the 2nd right interspace. The remaining portion of the lungs was clear to percussion and auscultation. Examination of the heart revealed the apex beat to be in the 5th intercostal space, 8 cm. from the midsternal line. The heart was not enlarged to percussion. A_2 was greater than P_2 , and there were systolic blowing murmurs at the base and apex. The apex beat was 88 and was equal to the pulse rate. The blood pressure in the right arm was 140/94, left arm 160/100. The abdomen was soft and showed marked weight loss. The liver was palpable 1 finger below the costal margin. There was right costovertebral tenderness. The extremities showed crepitation and swelling of the right knee, and clubbing of the right index finger. Neurological examination was negative except for impaired vibratory sensation.

Laboratory work revealed a sugar of 99 mgm.%; blood urea nitrogen 19.5 mgm.%; Wassermann was doubtful and Kline was positive. E K G showed a regular sinus rhythm.

The clinical impression of the mass in the right upper lung field was that of an aneurysm of the innominate artery; a teratoma and a dermoid cyst were considered as possibilities.

A roentgenographic examination of the chest revealed the following: There was a large oval mass occupying the major portion of the upper third of the right pulmonic field. The mass was situated anteriorly, sharply demarcated, compressing and deviating the trachea to the left. The lower left portion of this mass merged with the aorta. The upper portion of the mass extended to the axillary portion of the apical and sub apical portions of the chest. The heart was slightly enlarged. The aorta was sclerotic. There were calcareous plaques in the transverse portion of the arch, in the arch, and in the thoracic portion of the aorta. The thoracic portion of the aorta was tortuous.

Circulation tests prior to angiocardigraphy were as follows: Ether, 13 seconds; Macasol, 22 seconds; Decholin, 22 seconds; Saccharine, 23 seconds.

Angiocardigraphic examination in the PA projection (Fig. 2), at the end of 10 and 22 seconds revealed the following:

Contrast substance in the right heart was faintly visualized and showed an hypertrophy of the musculature of the right heart. The pulmonary arteries were visualized. There was an extensive collateral circulation in the right clavicular, right axillary and upper mediastinal regions. The axillary vein was of normal calibre. The brachial vein was markedly reduced in size. The subclavian was irregular and tortuous. There was a loss of vessel lumen at the junction of the subclavian and superior vena cava. The superior vena cava was markedly reduced in size and showed evidences of external pressure. There was an extensive collateral circulation in the lower portion of the axilla, with communicating branches to the superior vena cava. The hemi-azygos was visualized. A collateral leading to the dome of the right diaphragm was also visualized.

At the end of 22 seconds, the left heart was completely visualized. There was no hypertrophy of the left ventricle. The aorta contained contrast substance, and its tortuosity was well visualized. In addition, there was a large circular area of contrast substance within the mass previously described occupying the upper portion of the right hemithorax, which measured approximately 7 cm. in diameter. The contrast

substance was surrounded by a fairly thick wall below and laterally, and by a thick wall above and medially.

The mass in the upper portion of the hemithorax was diagnosed as an aneurysm with a thick clot. From the location, the possibility of an aneurysm of the innominate artery was more plausible than a saccular

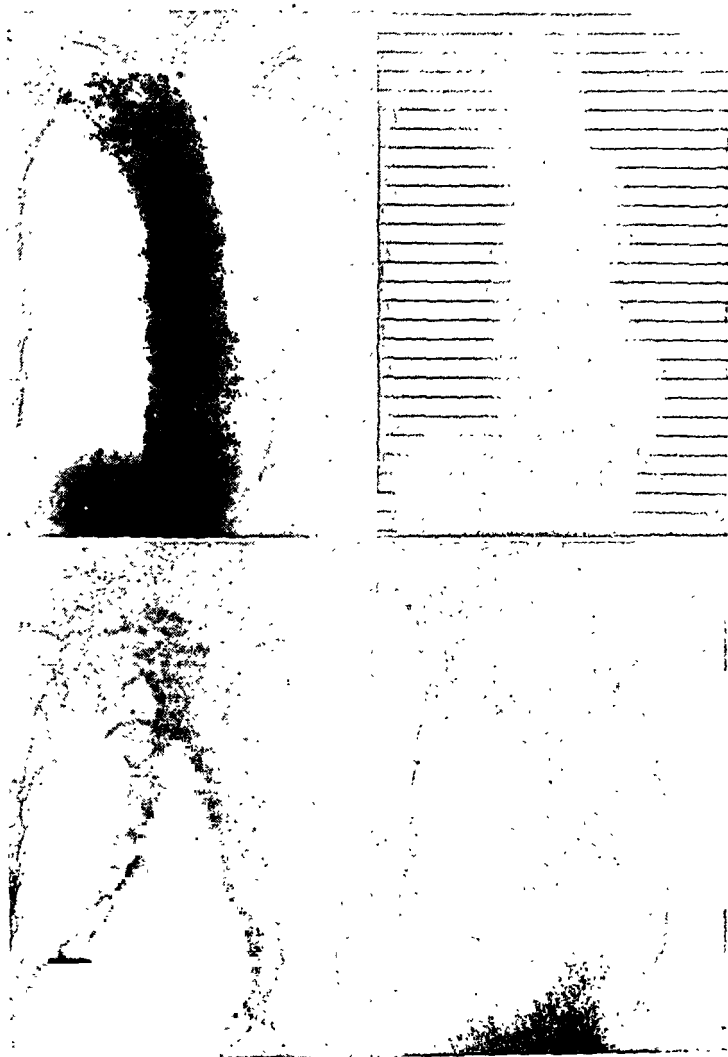


Figure 2, Female, aged 73: (A), There is a large oval mass occupying the apical and sub-apical portions of the right hemithorax, compressing and deviating the trachea to the left.—(B), Kymographic examination shows pulsations along lateral margin of mass synchronous with those of the aorta.—(C), Angiocardiographic examination: the right heart and collateral circulation are visualized at the end of 10 seconds.—(D), The left heart and aneurysm of the innominate artery are visualized at the end of 22 seconds. Verified post-mortem.

aneurysm arising from the arch. Unfortunately, roentgen studies in the oblique position were not made.

The patient was returned to Bellevue Hospital, where she died two weeks later. Post mortem examination at Bellevue Hospital revealed a luetic aneurysm of the innominate artery with thrombus formation.

Case 3: G. K., a white male, aged 45, was admitted to this hospital on March 22, 1945, with a chief complaint of epileptiform seizures for 13 years. His family history was non-contributory. He had been married for 19 years, and had 2 children, living and well. He admitted having a penile sore 10 to 15 years ago, but denied any serious illness. He travelled in the tropics, had never had any tropical disease, except for a watery diarrhea which persisted for quite a while several years ago. A number of years ago he began having dizzy spells, about 10 a day, for which he claimed to have received arm and hip injections over a long period. These attacks diminished in frequency to about once a week. During these spells he lost consciousness. Occasionally he had convulsions with severe attacks. He had no recollection of the attack when consciousness was regained. He had impairment of memory. He had no girdle or leg pains, no urinary or cardiac difficulties. There was no past surgical history, except for a T & A 19 years ago. He denied the use of alcoholics and smoked a pack of cigarettes a day.

Physical examination revealed a moderately well developed and nourished male, in no apparent distress. His eyes showed pin-point pupils which were round and equal, and did not react to light. The discs were normal. His heart was enlarged to the left in the 5th interspace, with evidences of a supra-cardiac area of dullness. The heart sounds were hyper-active, with A, greater than P. There was a loud systolic murmur over the aortic area. Blood pressure was 154/78. The abdomen revealed a scar over the right inguinal region. The remaining portion of the general examination was essentially negative. Neurological examination showed motor and sensory function intact. Reflexes were hyper-active and equal. His memory was very poor.

Laboratory findings were: Hgb. 13.6; WBC 11,000 with a normal differential; ESR 2 mm. after 1 hour; blood urea nitrogen 14.5 mgm.%; blood Wassermann 1+; BSP showed a 10% retention after 30 minutes; urine and stool negative; spinal fluid showed 1 white blood cell, was negative for ammonium sulphate; total proteins 30.6 mgm.%; Wassermann and Colloidal Gold were negative; BMR was minus 9; EKG studies were essentially negative.

A roentgenographic examination of the skull showed no abnormal findings. One of the chest (Fig. 3) revealed a mass in the supra-cardiac portion of the mediastinum to the right of the spine, and a diagnosis of an aneurysm was made. Angiocardiographic studies confirmed this diagnosis and revealed the presence of multiple aneurysm of the aortic arch, one containing a large clot.

Circulations tests prior to angiocardiography were: Ether, 3 seconds; Macasol, 12 seconds; Decholin, 13-4/5 seconds; Saccharine, 12-3/5 seconds.

Angiocardiography in the PA projection (Fig. 3) at the end of 3 and 13 seconds revealed the following: The right and left heart and large vessels were visualized in both projections. In addition, a band of contrast substance was visualized in the right paratracheal area, corresponding to the mass in the supracardiac portion of the mediastinum,

observed on routine examination. This band of contrast substance was visualized at the end of 13 seconds. The absence of contrast substance at the end of 3 seconds precluded it from being venous in origin. The upper portion of the superior vena cava was displaced slightly laterally and formed the lateral margin of the mediastinal mass. The subclavian and axillary veins were dilated.

Examination in the left oblique projection at the end of 3 and 12 seconds visualized the right and left heart and large vessels. The superior



Figure 3, Male, aged 45: (A), There is a mass in the supracardiac portion of the mediastinum, to the right of the spine.—(B), Angiocardiographic examination: the right heart and large vessels are visualized at the end of 3 seconds.—(C), The left heart and aorta are visualized at the end of 13 seconds. Contrast substance is also visualized in the right paratracheal area as a band like structure which may be a tortuous and dilated innominate artery.—(D), Angiocardiographic examination in the left oblique position at the end of 12 seconds shows 3 prominences to the aortic arch: multiple aneurysms.

vena cava was dilated and displaced anteriorly. There were evidences of external pressure against the superior vena cava by an aneurysm arising from the junction of the ascending and transverse portions of the arch. The aortic arch presented three prominences; a large one with a calcified periphery containing very little contrast substance; a second superimposed aneurysm; and a third localized prominence on the upper surface of the transverse portion of the aorta. From this there extended upward a faint shadow of contrast substance, which corresponded to the broad band-like structure observed in the P-A projection.

Hospital course: Patient was inoculated with vivax malaria and after several courses received a total of 55 hours of fever over 103 degrees. The malaria was terminated with suitable anti-malarial drugs. During the course of his stay, the patient had several epileptiform seizures, with amnesia for the affair and with mild or no convulsions. For these seizures, the patient was started on dilantin and the dosage finally set at .3 of a gram a day, in divided doses. This treatment was found to definitely diminish the frequency of his seizures. He was discharged on the 66th hospital day to return in three months for a follow-up on his aortic aneurysm.

Diagnosis: Tabes dorsalis.

Multiple aneurysms of the aorta, due to syphilis.

Induced malaria.

Case 4: F. D., a colored female, aged 63, admitted from the Out Patient Department on April 19, 1945, for diagnostic angiocardiology, who, when first seen at the clinic on March 14, 1945 complained of pain over the abdomen and shoulders. The patient stated she was well until about 1 year ago, when she had pneumonia. During the early part of last year, she first started having pains, which were fleeting in nature, noted principally across her chest, back, neck, and in her abdomen. Because of this, she stated, she was admitted to Harlem Hospital on May 25, 1944, and a transcript from this hospital revealed that a diagnosis of coronary thrombosis was made. A roentgenographic examination of the chest at that time showed a bulge of the left ventricle. She was treated conservatively and discharged on June 23, 1944 from Harlem Hospital. Since her discharge, she had a "sick feeling," especially in bad weather, which became progressively worse. A review of systems was essentially negative, except for a slight hacking cough, some dyspnoea on moderate exertion, and frequent skipping of the heart.

A routine fluoroscopic examination of the chest at the clinic revealed a bulge of the left ventricle, and it was decided to determine if this were a ventricular aneurysm by angiocardiology.

Physical examination revealed an elderly colored woman, in no acute distress. Her pupils reacted to light and accommodation. Ears, nose and throat were essentially negative. Chest was clear to percussion and auscultation. Examination of the heart revealed a normal rate and rhythm. There was no enlargement to percussion. No murmurs were heard. Blood pressure was 120/80. Examination of the abdomen was essentially negative.

Laboratory work revealed the following: RBC 4.59; Hgb 83%; WBC 4.8 with a normal differential; ESR 31 mm. per hour, and 15 mm. per hour; blood urea nitrogen 14.4 mgm.%; sugar 95 mgm.%; Urine, negative; Wassermann and Kline, negative; EKG revealed severe myocardial damage and intraventricular block.

A roentgenographic examination of the chest (Fig. 4) disclosed no infiltration or consolidation, no pleural effusion and no tuberculosis. The heart was enlarged; the axis transverse; the shape oval; and the configuration was that of an aortic or hypertensive type heart. In addition, there was a localized prominence to the left ventricular border due to a ventricular aneurysm. This was verified by angiocardigraphic studies. Kymographic examination showed no characteristic ventricular pulsations at the site of the bulge in the left ventricular border.

Circulation tests prior to angiocardigraphy were: Ether 5-1/4 seconds; Decholin 13-4/5 seconds; Saccharin 12-1/2 seconds; Macasol 13 seconds.

The following cases illustrate non-vascular lesions:

Case 5: A. A., a white male, aged 58, was admitted to this hospital on November 3, 1944 with a complaint of loss of weight, weakness, tiredness and persistent cough of 6 months duration. In October of 1939, while walking downstairs, he noticed that his knees were weak. He returned to bed and the next day found his legs were swollen, especially at the joints and that he was unable to move them. His arms and elbows were similarly involved. He was taken to Morrisania Hospital, where he remained for 2 months, and was told that he had had a "rheumatic attack". He returned home and remained in bed for seven months until his legs were strong enough to support him. His present illness began 6 months ago, when despite an enormous appetite he began to lose weight. His weight dropped from 160 to 140 pounds. He became weak, progressively more tired, slightly dyspnoeic, and at night slept with 3 pillows to relieve his cough. At night he felt hot and perspired a great deal. He had no chest pain and was not aware of any glandular enlargement. On November 2, 1944, he was admitted to Metropolitan Hospital. There it was found that his WBC was 400,000, with over 90% lymphocytes. He was transferred to this hospital on November 3, 1944. His family history was non-contributory. A review of systems revealed that he had had a cough for 20 years. Coughing spells occurred mostly at night and produced a teaspoonful of a whitish-yellow sputum during an episode. He had no history of hemoptysis, chest pain, night sweats or weight loss. He was told that he had bronchial asthma. However, he never had a frank asthmatic attack, and never received any type of injection. He had been taking variously colored capsules over a period of years. He never had pneumonia, but did take cold easily. In 1936, and again in 1943, he stated, he had gonorrheal infections. He denied a luetic history.

Physical examination revealed a poorly nourished, middle-aged man, in no acute distress. He was somewhat dyspnoeic. He had a right corneal opacity. His left pupil reacted to light and accommodation. His ears, nose and throat were essentially negative. He had markedly enlarged, discrete, rubbery glands in the anterior and posterior cervical, sub-axillary, axillary and inguinal regions. His chest was emphysematous, hyper-resonant, and breath sounds were increased, particularly during the expiratory phase. Inconstant, scattered rales were heard throughout both lung fields. The cardiac borders were not percussable. The point of maximum intensity was heard in the 5th interspace at the mid-clavicular line on the left. Heart sounds were of fair quality, and the first sound was split at the apex. A_2 was greater than P_2 , and there

was felt this might be enlarged nodes or an aneurysm. Oblique views a short time later did not distinguish the origin of this mass.

Course: On November 14, 1944, 11 days after admission, the patient began receiving roentgen therapy to the spleen. After 4 treatments, his WBC had dropped to 66,000. Clinically during this period the patient was in excellent spirits and had no complaints. He gained 3 pounds. His spleen, liver and lymph glands had not appreciably changed since admission. The radiation therapy was terminated on November 27, 1944. At this time the WBC was 66,000; RBC 3.45; Hgb 61%. Several days later the patient began to cough and was dyspneic. On December 8, 1944, his count was 400,000 with 95% mature lymphocytes. Radiation therapy was again instituted and on December 22, 1944, his WBC was 13,000 with 69% lymphocytes. There was no change in the appearance of the paratracheal mass.

On December 27, 1944, angiocardigraphic studies were made, without ill effects and revealed the following:

Angiocardigraphic examination in the PA projection (Fig. 5) at the end of 3 seconds, visualized the entire right heart, pulmonary aorta, right and left pulmonary arteries, and several pulmonary vessels, as well as the superior vena cava. The right heart was not enlarged. The upper surfaces of the right and left pulmonary arteries showed evidences of pressure from a mass in the superior mediastinum. At the end of 10 seconds, the left heart and aorta were visualized. The left heart was not enlarged. The musculature of the left ventricle measured approximately 8 mm. in thickness. The aorta was outlined within the mass in the superior mediastinum. The mass within the superior mediastinum contained no contrast substance, except for that within the aorta. Examination in the left oblique projection at the end of 9 seconds showed contrast substance in the left heart and aorta. The left auricle was visualized, as well as the vessels leading into it. The lumen of the ascending aorta measured approximately $4\frac{1}{2}$ cm., while the transverse and descending portions measured $2\frac{1}{2}$ cm. The large vessels leading from the aortic arch were visualized. There was no contrast substance within the mass. There was a slight fusiform dilatation of the ascending aorta. The large mass in the superior mediastinum did not fill with contrast substance; it was not vascular in origin.

The patient was discharged with a WBC of 20,000. He had gained 4 pounds; his cough and dyspnea had improved, and the lymph nodes throughout his body had decreased in size. There was no change in the size of the spleen.

The clinical improvement did not last. He was readmitted to the hospital in March and again in July, because of dyspnea, fatigue and generalized enlargement of nodes.

Case 6: M. H., a white female, aged 46, a registered nurse by profession, was referred by Dr. Louis R. Davidson for angiocardigraphic study because of the presence of a mass in the upper and anterior mediastinum. She had always enjoyed good health. Twelve years ago she had had a normal BMR. Ten years ago, while in the Public Health Service, in the course of an annual examination, she had had a kymographic and roentgenographic examination of the chest; these were reported as normal. She was married 16 years ago; had one child; living and well. There is no previous surgical history.

During the past winter she had a laryngitis. Recently the patient

developed a cough which she thought was due to a sinus infection; this was followed by a wheeze. A roentgenographic examination of the chest revealed a large mass in the anterior superior mediastinum which extended to either side of the mid line. The trachea was compressed and deviated to the left. Other laboratory data revealed a normal EKG, and a -7 BMR.

Circulation tests were: Ether, 3 seconds; Macasol, 10 seconds; Decholin, 9½ seconds; Saccharine, 10 and 12 seconds.

Angiocardiographic examination (Fig. 6), revealed the following: The heart and large vessels were opacified in the PA and LAO projections at the end of 3 and 10 seconds. No contrast substance opacified any portion of the mediastinal mass, and therefore it was considered as non-vascular in origin.

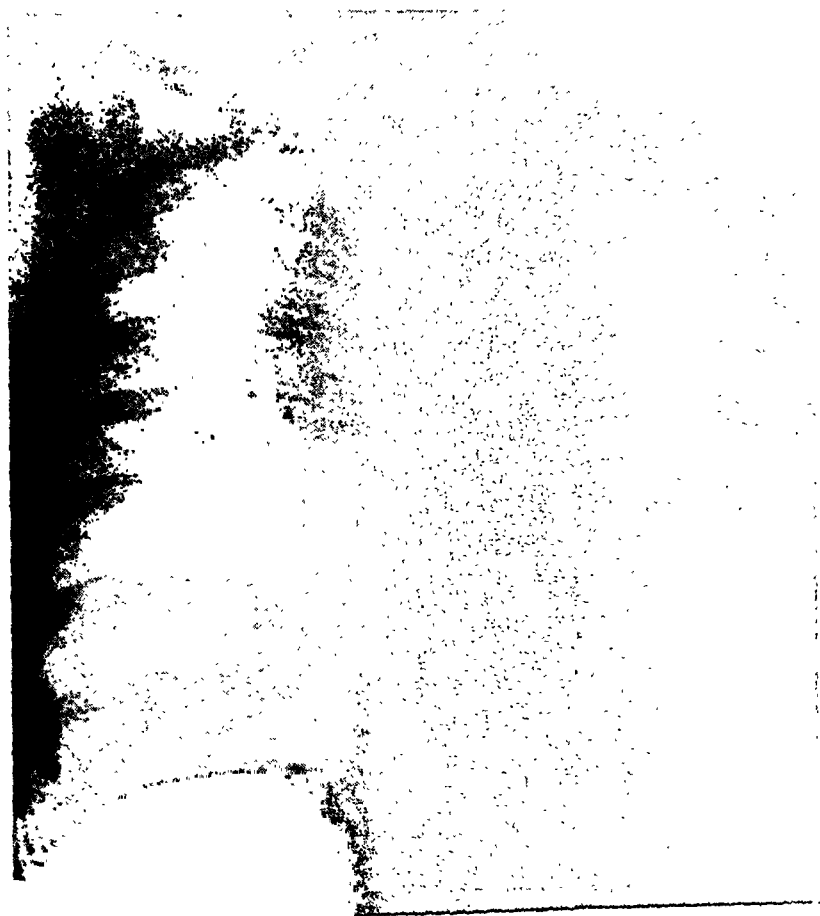


Figure 6, Female, aged 46: There is a large mass in the superior mediastinum compressing and deviating the trachea to the right. The mass extends to either side of the mid-line, down to the aorta. Angiocardiographic examination at the end of 3 and 10 seconds failed to show any contrast substance within the mass: it is non-vascular. Surgery was instituted and the mass proved to be a retro-sternal thyroid.

Surgical intervention and excision of the mass by Dr. Louis R. Davidson proved it to be a large retrosternal thyroid.

SUMMARY

Six cases with angiocardigraphic studies are illustrated: One with a cardiac lesion, two with non-vascular and three with vascular lesions. The cases illustrate a left ventricular aneurysm; two nonvascular mediastinal lesions: a retrosternal thyroid, and a chronic lymphatic leukemia; an aneurysm of the innominate artery; an arteriosclerotic aneurysm of the descending aorta; and multiple aneurysms of the aortic arch.

667 Madison Avenue.

RESUMEN

Se ilustran seis casos con estudios angiocardiográficos: Uno con una lesión cardíaca, dos con lesiones no vasculares y tres con lesiones vasculares. Los casos ilustran un aneurisma del ventrículo izquierdo; dos lesiones mediastínicas no vasculares: una glándula tiroides retro-esternal y una leucemia linfática crónica; un aneurisma de la arteria innominada; un aneurisma arterio-esclerótico de la aorta descendiente; y aneurismas múltiples de la curvatura de la aorta.

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The Bearers of Shadows

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MASS FLUOROGRAPHY

In 1917, in Paris, during the first World War, I was studying in the tuberculosis dispensary of the Laennec Hospital, then directed by Dr. E. Rist. I was very young and inexperienced then, but the circumstances of the moment, as well as the association of a double curiosity in my mind—the study of physics and medicine—led me to think in 1918 of the possibility of fluorography, so as to obtain small documents of very low cost, permitting the x-ray examination at the dispensaries.

After a long stay in Paris, from 1914 to 1922, I returned to Rio de Janeiro, where I intended to fully realize my career. The problem was that of the diagnosis of tuberculosis and of cardiovascular affections which had to be done in the early stages and on a large scale. I resumed in Rio, in the Superintendency for the Prophylaxis of Tuberculosis, newly created by Placido Barbosa, the experiments interrupted in Paris, and in 1924 I obtained some fluorographic negatives. However, it was still too early. I did not succeed in emerging from the experimental stage. But, already at that time, the miniature radiograph and its vast social application, seemed to me to be the only solution to the problem of the mass diagnosis of apparently healthy persons.

At last, in 1935, I came back to systematic fluorography. The luminous slides of calcium tungstate, lens of 1-1.5 aperture, linear cathode tubes and the photographic emulsions of 28° Scheiner, included the necessary condition for the realization of an idea of my youth—the radiographic examination of population groups. I constructed a frame in the shape of a truncated pyramid, fixing the camera in its smaller base, and at the larger one the fluoroscopic screen. The complete frame slid between four columns. It was the first micro-radiographic apparatus which I exhibited in 1936 to the Medical Society of Rio and Sao Paulo. The negatives measured 35 and 40 mm. The clearness and the contrast were good, obtaining a favorable report from the Brazilian Society of Tuberculosis, which recommended the adoption of the new method.

In February 1937, I inaugurated the first Survey Center in the Rio Public Health Department, based on the 35 mm. fluorography; it was intended for social groups of apparently healthy individuals. In the same year the Central Navy Hospital and the Public Health

Department of the city of Victoria also inaugurated identical services.

The Tuberculosis Congress of Santiago, Chile, in 1937, contributed in a decisive way towards the knowledge and universal use of fluorography, for several European and American specialists, when passing through Rio, visited my installations at the Public Health Department, where about 200 examinations were being made daily.

Great tenacity and confidence were needed by my early collaborators and myself to overcome a traditional reluctance to accept the new method. The dispensaries used to receive the patients when it was already too late, and the advanced tuberculosis no longer responded to the treatment. Those patients had come to the end of their career as spreaders of the infection, so that the prophylatic function of the dispensary was almost nil. This conception of the individual and late diagnosis, practically useless, was in opposition to that of the early and mass diagnosis. Besides, the fluorographic negatives, although excellent, were not well accepted from the start owing to their small dimensions. It was found necessary to carry out a vast campaign from 1937 onwards, with the collaboration of several friends, among whom I must mention Clemente Ferreira, A. de Paula, F. Benedetti, S. Neves, P. Cortes, G. Ribeiro, A. Lopes (Brazil); E. Mazzei, G. Sayago, Rodolfo Vaccarezza, Raul Vaccarezza (Argentine Republic); J. Morelli, L. Sayet, P. Purriel, A. Piaggio (Uruguay); and during this campaign I lived the best days of my life.

Then there occurred a complete transformation in the attitude of the scientists with regard to the fight against tuberculosis. The idea of the systematic and periodical examination of whole population groups, formerly considered as a visionary conception, acquired the force and beauty of a simple truth. And the movement against tuberculosis took the following course—the early discovery of affected persons in the first phase of the evolution of tuberculosis, when treatment appears to be efficacious and when isolation protects the community.

BEARERS OF SHADOWS

But the adoption of the systematic and periodical examination by means of fluorography, discovering bearers of shadows in the lungs, frequently during the initial period of tuberculosis, has come to prove that the bacteriological examination according to customary techniques is not entirely satisfactory. A large number of problems appear with serious consequences. Are we dealing with evolutive or residual tuberculosis? Should we induce pneumothorax or should we wait? In the case of an employee or worker should he be employed, be given leave of absence, pensioned off

or not? Should a health certificate be granted or not? The presence of the bacillus in the sputum constitutes thus the indispensable complement to the radiographical examination, without which there can be no etio-pathogenic or evolutive diagnosis.

In order to solve such a distressing problem, phthisiologists are resorting to the examination of the sputum and the gastric lavage. The former requires the presence of sputum in sufficient quality and quantity; being generally useful in cases of pulmonary tuberculosis in frank evolution, often largely excavated. The latter presents great variations, and in patients affected with active tuberculosis can be repeatedly negative. Indeed, the presence of the broncho-alveolar secretion in the fasting stomach varies in proportion to several factors which render the above mentioned examination deficient and laborious.

LOCALIZED TOMOGRAPHY

Based on these considerations and being the director of a Diagnosis Revision Committee, which handles numerous cases demanding a rapid and accurate solution, I thought of using in all the *bearers of shadows* the *localized tomography*. I do not tomograph the whole chest, but only the places where there are shadows, in films of small size, 9 x 12 and 13 x 18 cm., sometimes 24 x 30 cm. Generally, 3 sections are enough, at the depth of 7, 9 and 11 cm.

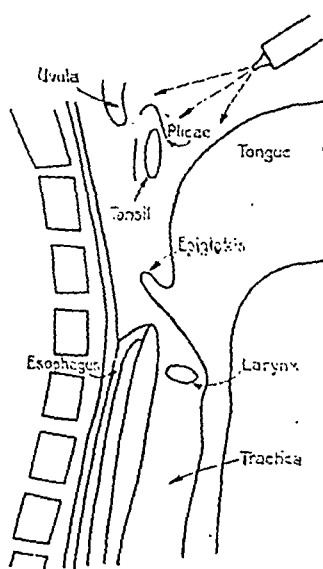


Figure 1

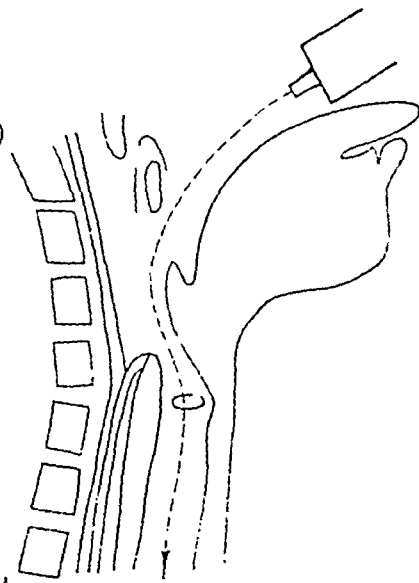


Figure 2

Fig. 1: Technique of the supra-glottic anaesthesia: uvula, tonsil, plicae and pharynx.—Fig. 2: Infra-glottic anaesthesia during inhalation: larynx, trachea and bronchi. Lung lavage with physiological saline.

from the posterior surface of the thorax. The localized and systematic tomography seems to me very important for studying the structure of lesions, and can easily make the diagnosis of cavities (invisible in the usual type of radiograph), calcareous or fibro-calcareous lesions that represent indurated fields without activity, nodules and closed infiltrations more or less organized, in which activity is absent or very low, atelectasis, and alveolar infiltrations or exudative processes that seem to be active.



Figure 3

Figure 3A

Figs. 3 and 3A: Fibro-calcareous lesions, well visible in the tomogram. Lung lavage negative for Koch bacilli.



Figure 4

Figure 5

Fig. 4: Discrete early infiltration under the clavicle. Lung lavage positive.
Fig. 5: Discrete and chronic lesions in the apex, stabilized during one year. Lung lavage positive.

LUNG LAVAGE

At the same time, in ill patients without expectoration or with scant expectoration negative for the Koch bacilli, I use a new method, the *lung lavage* or *tracheo-broncho-alveolar lavage*, which I think is the solution of the problem of demonstrating the elimination of bacilli.

The technique of the *lung lavage* is as follow: 1) Anaesthesia of the supraglottic region with 1 to 2 cc. of a 0.5 per cent solution of novotutocain. The anaesthesia should be applied slowly with a small syringe of 2 cc. capacity. 2) Slight traction and fixation of the tongue and infra-glottic anaesthesia, during inhalation (1 to 2 cc. of the same solution). 3) Injection, under the same condition, from 10 to 20 cc. of physiological saline during inhalation. 4) Provoke cough and collect secretion or material for examination.

ACTIVE AND INACTIVE TUBERCULOSIS

Undoubtedly, the aim of the revision is to ascertain as quickly as possible the category of the patient, in accordance with the following classification:

Non-tuberculous affection.

Inactive tuberculosis.

Active tuberculosis.

In the case of a non-tuberculous affection, a diagnosis should be arrived at and this has been done in several instances (emphysema, air cysts, congenital bronchiectasis, other pneumopathies, cardiovascular affections, etc.).



Figure 6



Figure 6A

Figs. 6 and 6A: Primary affect with erythema nodosum. Lung lavage positive.

The activity or evolutive potential of tuberculous lesions is reflected in the clinical symptomatology, in radiographic figures and in bacteriological data. The last two seem to us to be the most important, principally in view of the culture and inoculation into the guinea pig of the material collected by the lavage. Besides, I have observed perfect harmony between radiography and bacteriology. In 3 cases only the radiographic image has appeared relatively larger while the bacteriological test was negative. This apparent disagreement should be cleared up by prolonged observation of the patients, who are cases of closed tuberculosis or of non-tuberculous affections, such as blastomycosis. Cases of tomographic diagnosis of a cavity with a small diameter diagnosed by tomograms, have revealed positive lavage. Also one case of primary form in an adult (primary affect and erythema nodosum) had revealed positive lavage.

Generally speaking, the fibrous forms, accompanied by calcareous impregnations, were negative to the bacteriological examination. On the contrary, the exudative and excavated forms were positive.

Another important point is the following: the majority of positive cultures presented very few colonies, sometimes one or two in five tubes; it concerned patients with a paucity of bacilli and with several previous negative examinations. The aforesaid circumstance demonstrates the efficiency of the lung lavage, followed by a thorough bacteriological test.



Figure 7



Figure 7A

Figs. 7 and 7A: Infiltration and cavity, better seen in the tomogram. Lung lavage positive.

BACTERIOLOGY

Direct examination, culture on Loewenstein medium and guinea pig inoculation, are systematically made. The culture and the inoculation are indispensable, especially in forms of tuberculosis without sputum or with a negative one. In 32 positive lavages for the Koch bacillus, the following was observed:

Direct examination	5 — 15.62%
Culture	22 — 68.75%
Inoculation	5 — 15.62%
Total	32

Thus, the direct examination, not homogenized, was positive few times because of the small number of bacilli. In about 70 per cent of the cases the culture revealed the presence of the bacilli, only a few colonies appearing in each tube. Lastly, in approximately 16 per cent of the lavages, only inoculation proved conclusive.

In three of the cases of positive direct examination, innumerable negative tests had been made in the usual manner, including the gastric lavage.

STATISTICS

To date, 450 lung lavages have been performed. Of these, 313 cases have completed the time limit necessary to obtain final

*Figure 8**Figure 8A*

Figs. 8 and 8A: Exudative form. Cavity visible only in the tomogram. Lung lavage positive.

results of cultures and inoculations of guinea pigs. These first statistics reveal the following results:

Lung lavage in individuals without sputum or with negative sputum (313 original cases):

	Number	Negative	Positive
Suspected	176	160	16 — 9.09%
Patients and ex-patients	137	105	32 — 24.87%
Total	313	265	48 — 15.33%

It is a well-known fact that the number of positive cases varies greatly. In our first 42 lavages we had 33.33 per cent; in the last 38, however, this was reduced to 7.9 per cent. The presence of the bacillus depends on the human material, being more frequent in patients under treatment or clinically cured, but rarer in suspected persons who are bearers of discrete shadows, revealed by systematic x-ray examination.

A comparative study of the lung lavage and that of the stomach has been made. Dr. R. Fernandes made these tests on the same day, on 18 apparently cured patients, at the Miguel Pereira Hospital. Here are the original results:

	Stomach	Lung
Negative	17	10
Positive	1 — 5.55%	8 — 44.44%



Figure 9



Figure 9A

Figs. 9 and 9A: Exudative form. Cavity visible only in the tomogram. Lung lavage positive.

We emphasize the following fact: the patients appeared to be clinically cured, and in addition, the gastric lavages were performed with exacting skill, that is, during hospitalization.

We are indebted to our colleagues F. Magarao, J. Dauster, R. Fernandes, G. Ribeiro and Machado Junior for their invaluable collaboration in this work.

CONCLUSOES

O autor mostra a evolucao da fluorografia sistematica no diagnostico da tuberculose pulmonar, iniciada em 1936, oficialisada no inicio de 1937, no Rio, depois, a partir de meados de 1938, divulgada na Europa e America. Descreve o movimento inspirado pelo novo metodo em que a medicina, de estatica e tardia, passou a ser dinamica e oportuna, procurando os doentes ocultos na massa coletiva.

Os *portadores de sombras* apresentam lesoes pulmonares cuja atividade precisa ser esclarecida. Neste momento, devido ao exame sistemático, sao numerosos os casos de sombras que correspondem a processos—residuais ou, ao contrário, em plena evolucao. Sao individuos clinica e socialmente normais ou doentes. Nestes será necessário aplicar o tratamento e o isolamento convenientes.

Em todos os portadores de sombras o autor emprega a tomografia localizada para o estudo da estrutura anatomo-radiológica, assim como o lavado pulmonar para a pesquisa do bacilo de Koch. Descreve os resultados da tomografia localisada e a tecnica do lavado pulmonar, mais simples e mais eficiente que o lavado gastrico, no adolescente e no adulto. Mais de 500 casos de tuberculose aparentemente inativa foram examinados da referida maneira pela Comissao de Diagnóstico, sendo a incidencia da tuberculose evolutiva nos mesmos de 15.33%.

Complemento indispensável dos postos de exame sistemático pela fluorografia, sao os laboratórios centrais de radiologia e bacteriologia, dotados de aparelhagem e pessoal capazes de realizar numerosas tomografias, culturas e inoculacoes em cobaia. O problema da atividade das lesoes pulmonares tem hoje amplitude social e requer instalacoes novas e efficientes.

Neurogenic Tumors at the Pulmonary Apex

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Since Pancoast's report in 1924 and again in 1932¹¹ of seven cases of an intrathoracic tumor occurring at the pulmonary apex and to which he gave the name of superior pulmonary sulcus tumor, neoplasms in this particular area have attracted the attention of roentgenologists, clinicians and pathologists. Pancoast's suggestion that this tumor was a new entity, probably having its origin from an embryonic remnant of the fifth branchial pouch soon was challenged and as cases accumulated it became evident that the syndrome described by him (tumor in the pulmonary apex associated with rib or vertebral destruction, pain around the shoulder and down the arm and Horner's syndrome) could be produced by a variety of malignant neoplasms, most of which were primary carcinomas of the apex of the lung.^{2,4,12}

The interest in these malignant tumors has overshadowed to some extent the fact that growths of a benign nature, mostly neurogenic in origin, show a distinct tendency to develop in this same location. In the literature most of these have been described as of mediastinal origin since they are prone to originate from the intercostal nerves close to the spine or from the para-vertebral ganglionic chain in the posterior mediastinum. As the tumor enlarges it protrudes into the lung field and its chief clinical and roentgenological manifestations may be pulmonary rather than mediastinal. Perhaps it would be better to speak of these as intrathoracic rather than mediastinal since they usually do not remain confined to the mediastinal space even though originating there. Also those that develop from the intercostal nerves may be found at some distance from the spine although this is not common.

TYPES OF TUMORS AT THE PULMONARY APEX

It is possible, as Ray¹² suggests, to postulate innumerable kinds of tumors in the region of the pulmonary apex. In his review of fifty collected cases of malignant lesions, among those having autopsy studies there were 15 carcinomas of the lung primary in the apex, 2 squamous cell carcinomas of branchial origin, 1 sympatheticoblastoma, 3 epithelial carcinomas of unascrbed origin, 1 metastatic carcinoma from the pancreas and 1 metastatic carcinoma from the esophagus.

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The incidence of all benign intrathoracic tumors is low and most of these are found in the mediastinum or along its borders. In Blades¹ review of collected cases there were 233 cases of teratoid tumors, all but three of which originated in the anterior mediastinum. The next most frequent tumors were those of the neurogenic group, of which there were 135 reported cases, the majority arising in the posterior mediastinum or along its margins. All of the remaining types were rare and were listed as follows:—fibromas, 32 cases (some of which may have been neurofibromas); tumors arising from bone or cartilage, 14 cases; intestinal cysts, 15 cases; lipomas, 34 cases; xanthomas, 5 cases.

Among the benign tumors likely to occur in or along the pulmonary apex there is general agreement that the neurofibromas and allied neurogenic tumors are by far the most common.^{1,3,9} The histological classification of tumors arising from the nerves and ganglia is complex and controversial and is beyond the scope of this report. Regardless of the exact cell type, the potentiality for malignant degeneration seems to be present in all. According to Fischer,⁵ in a review of collected cases, the incidence of malignant degeneration in neurofibromata was 13 per cent. Recognizing this possibility, the clinical diagnosis of an intrathoracic neurogenic tumor carries with it the chance that malignant changes may be revealed on microscopic examination.

CLINICAL FEATURES

The benign intrathoracic neurogenic tumors as a group show a tendency to develop to a considerable size without significant symptoms until encroachment upon or displacement of some vital structure ensues. This is true of those occurring at the pulmonary apex as well. Discovery often is accidental upon roentgenography of the chest for some other cause or merely as a routine study. When symptoms do develop pain in the chest and cough are common.¹⁰ Harrington⁸ lists dyspnoea as the most frequent symptom in his series. In those tumors limited to the pulmonary apex, and in marked contrast to the malignant tumors in this region, the occurrence of a Horner's syndrome and of pain radiating down the arm has been described but rarely. Schaffner et. al.¹² reported one such case, the lesion upon removal proving to be a neurofibroma. In Harrington's series of 14 cases of intrathoracic neurogenic tumors, one patient had a Horner's syndrome and this proved to be the only malignant tumor in the series. Not all were located in the lung apex, however. The clinical signs of involvement of the paravertebral ganglionic chain are more indicative of a malignant lesion than of a benign one, although this cannot

be considered as an absolutely reliable differential diagnostic point. The neurogenic tumors show no age or sex predilection.

ROENTGEN FINDINGS AND DIFFERENTIAL DIAGNOSIS

The tumor mass is visualized on roentgen examination of the chest as a sharply circumscribed, homogeneous shadow of variable size located at the summit of the pulmonary apex or along the medial aspect of the apex. The inner margin tends to merge with the mediastinal shadow although with properly exposed roentgenograms, the entire circumference of the mass may be visualized. Stereoscopic views, when the tumor is small, together with lateral and oblique projections, show the mass to be located posteriorly and in close association to one or more of the upper ribs and the spine. Larger tumors fill the apex completely and may extend below the anatomical apex so that their posterior origin can no longer be determined. These larger masses may also displace the esophagus and trachea, the smaller ones do not. No destruction of bone is evident although a pressure type of erosion of one or more ribs may be present especially if the lesion is large. At the junction of the mass and the apical or mediastinal wall an acute but smooth sulcus may be formed suggesting a stripping or reflection of the pleura over the mass. It is important that the roentgen examination be thorough, so that the relationships of the lesion and the condition of the adjacent bony structures be determined.



Figure 1



Figure 2

Fig. 1, Case 1: Roentgenogram of the chest showing a large circumscribed mass in the right apex. This was discovered on a routine admission photofluorogram.—Fig. 2, Case 1: Potter-Bucky film to show bone detail. There is no involvement of the ribs or vertebrae. The trachea is displaced slightly to the left of the midline.

At first glance the differential diagnosis of these tumors seems complex. Yet actually there are relatively few lesions that need to be considered. The differentiation from malignant tumors in this area (the superior pulmonary sulcus tumor of Pancoast) is perhaps the most important. These latter tumors are inoperable, usually radioresistant and carry a hopeless prognosis. In contrast the benign neurogenic tumors, and even those that show microscopic evidence of malignancy, usually are amenable to surgical removal. Ray¹² goes so far as to suggest that all tumors at the apex of the lung, even though all the evidence indicates that they belong to the Pancoast syndrome, should be explored surgically on the chance that an occasional neurogenic tumor might be encountered and found operable. The malignant neoplasms cause rib and/or vertebral destruction in the vast majority of cases although this may not happen until late in the disease. This destruction has the characteristic "melted ice" appearance seen with invasion of bone by carcinoma. In Pancoast's cases it began

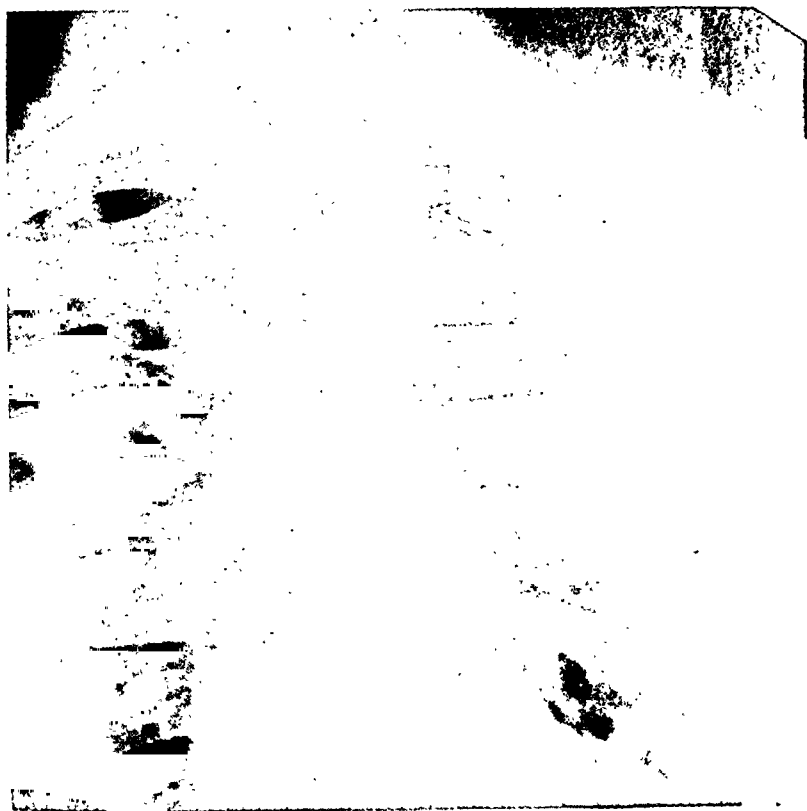


Fig. 3, Case 2: Small mass along medial aspect of left apex. There is no rib or vertebral erosion.



Figure 4A

Figure 4B

Figure 4C

Fig. 4, Case 3: (A), Employees routine roentgenogram, 11-6-40. Small circumscribed tumor mass along medial aspect of left apex. This was present in a chest roentgenogram in December, 1937, but had increased in size since then.—(B), One year later (11-3-41). Slight increase in size.—(C), Eight months later (7-21-42). No visible change. Final observation (5-13-43) by photoroentgenogram showed no apparent change.

in the first rib in four, and in the second and third in two others. The rib involvement began from three to nine months after the onset of symptoms. In the series reviewed by Ray (fifty cases) some bone destruction was present in the neighborhood of the tumor in 90 per cent. The most outstanding symptoms in these cases were due to irritation or damage of the upper intercostal nerves, the brachial plexus and thoraco-cervical sympathetic ganglionic chain. These symptoms were, almost without exception, the first to appear and the most prominent throughout the course of the disease.

A comparison of the roentgenographic images of these malignant tumors and those of benign nature reveals some significant differences. A study of our own cases and of those illustrated in the literature shows, in the malignant lesions, a much less distinctly outlined shadow. In some the shadow was very hazy and small and could easily be missed on casual inspection. Yet these minute lesions could be responsible for severe clinical symptoms. This is in marked contrast to the benign growths which are sharply circumscribed, show no bone invasion and which may develop to a large size before symptoms appear.

There are a number of causes for soft tissue shadows in the region of the pulmonary apex including enlarged thyroid and substernal extensions of the thyroid, tumors of the thyroid and thymus, neoplasms of the paratracheal and anterior mediastinal

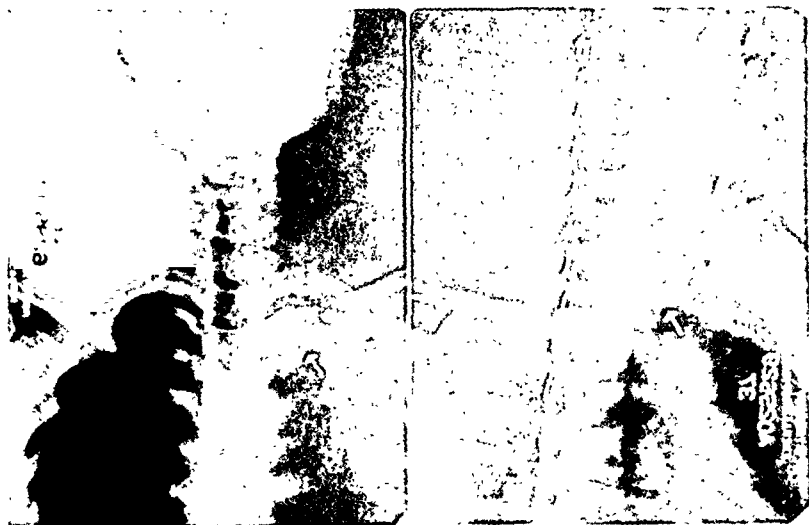


Figure 5A

Figure 5B

Fig. 5, Case 3: (A), Bucky film AP view. No rib erosion. Pedicle shadows intact.—(B), Oblique projection demonstrates the mass to be posteriorly in close association with the second rib.

lymph nodes, aneurysms of the vessels arising from the aortic arch, tortuous and sclerotic innominate and subclavian arteries, and tumors arising from the ribs, vertebrae, clavicles or sternum. Most of these can be recognized readily by their appearance and location, the presence of pulsation in the case of vascular lesions, movement upon swallowing in the thyroid enlargements and the character of bone changes in those arising from bone. None of them produce quite as sharp, distinctly outlined and circumscribed a mass as the neurogenic neoplasms. Diagnostic pneumothorax can be utilized if necessary to show the extrapleural nature of the tumor. Solitary metastasis especially from the kidney or testicle must also be considered. It should be possible to demonstrate the primary tumor in most instances. If lymphoblastoma is a serious consideration, test doses of radiation may be given to determine the radiosensitivity of the tumor. Primary tumors of the pleura are rare. The same is true of other benign tumors which might be found along the upper posterior mediastinum. None of these can be excluded with certainty except on the basis of statistical probability. The teratoid tumors occur almost exclusively in the anterior mediastinum and somewhat away from the apical area. Other congenital cysts are found usually in the central mediastinum.

TREATMENT

The treatment of these tumors is surgical. They are almost entirely radioresistant and radiation therapy has little to offer. Surgical removal is indicated even though the tumor is small and asymptomatic because of the inherent tendency for malignant degeneration, the probability of increase in size making later removal difficult, the always present possibility of malignant change having already begun in a neoplasm which is grossly benign, or because of a mistaken diagnosis.

CASE REPORTS

Case 1: (L. J.). This was a 29 year old white male admitted to the hospital with chief complaints of weakness and tiredness present off and on for the past four years but which had been worse the last four weeks following the extraction of two teeth. There had been a weight loss of about eight pounds. There was a slight hacking cough with the raising of very little sputum. He also complained of night sweats and difficulty in getting to sleep. Physical examination showed nothing remarkable, routine laboratory studies were within normal limits and neurological examination showed nothing abnormal. A routine photofluorographic admission film demonstrated a tumor mass at the apex of the right lung confirmed by further studies (Figs. 1 and 2). On further questioning after the discovery of this mass the patient said that he had been told that he had such a tumor following an x-ray examination of the chest nine years previously. He also had noticed

that he sweated only on the left side of the face, neck and upper chest and not on the right and that he had been aware of this for the past six or seven years. Surgical excision of the tumor was decided upon and after some difficulty, because of its size, the entire tumor was removed. It weighed 236 grams. The histologic diagnosis was neurofibroma. Post-operative convalescence was uneventful except that following operation a Horner's syndrome appeared on the right side and was still present at the last examination two months later. Otherwise the patient had no complaints and had gained six pounds in weight.

Comment: The relationship of this patient's symptoms and the tumor is questionable although Harrington⁸ was impressed by the frequency with which patients with intrathoracic neurogenic tumors complained of chronic exhaustion and fatigue. The lesion was too large to determine whether it had originated from the posterior aspect of the apex or not but all of the other findings pointed to a benign growth including the history of nine years' duration, and the preoperative diagnosis was neurofibroma. The development of a Horner's syndrome immediately after operation was due probably to injury of the adjacent ganglia during the operative procedure.

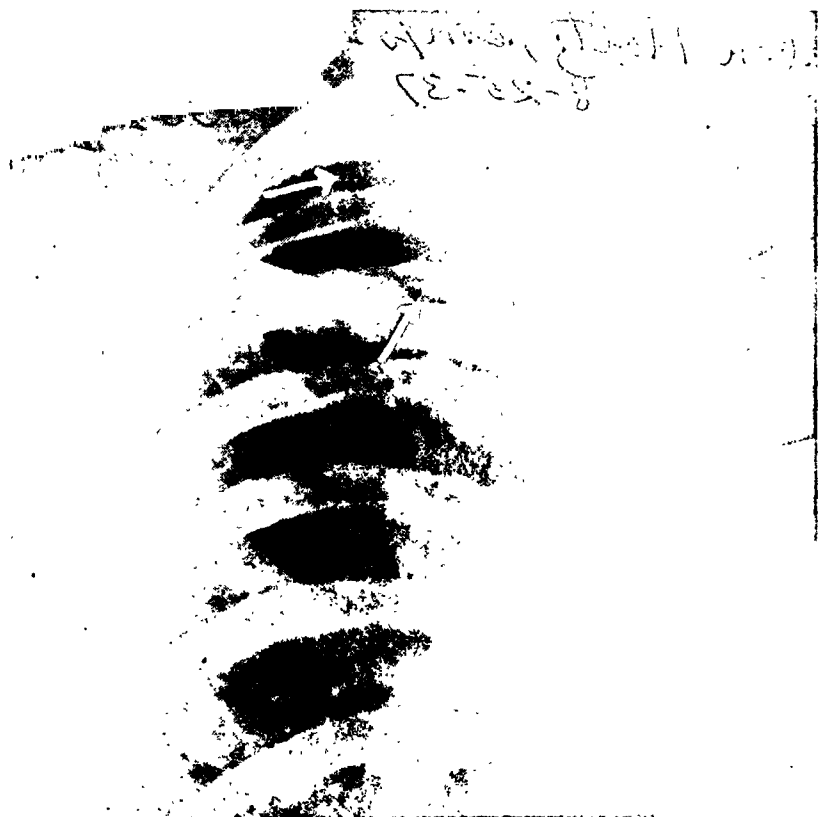


Fig. 6A, Case 4: Employee's original roentgenogram of 8-25-37. Small circumscribed mass in right apex.

Case 2: (H. M.). The patient was a white male, 35 years of age, admitted to the hospital on October 4, 1943. About 7 months prior to admission, he first noticed some dizziness which had continued more or less constantly. Soon afterwards he developed a dull feeling over the right side of the face and ringing in the right ear. During the last month there had been a decrease in hearing in the right ear. There had been a weight loss of 20 pounds. On physical examination a slight prominence of the right eyeball was found. The neurological findings included hypesthesia of the second and third divisions of the right fifth nerve, diminished corneal reflex on the right, taste absence on the anterior two-thirds of the tongue on the right, absent abdominal reflexes, knee jerk diminished on the right, and nystagmus more marked on gaze to the right. Audiogram showed a marked deafness on the right. Routine blood, urine and spinal fluid studies were normal. A routine chest roentgenogram revealed a small tumor mass at the left apex (Fig. 3). A diagnosis of right cerebello-pontine angle tumor was made and the lesion in the chest was considered to be a neurofibroma. On surgical exploration of the right cerebello-pontine angle region a fungating tumor mass was found penetrating deeply. A small biopsy



Fig. 6B, Case 4: Three and one-half years yater (1-28-42). No apparent change in size.

was taken and on frozen section was reported as adenocarcinoma and nothing further was done surgically. However, on study of the fixed sections the pathologist reported no tumor tissue present and stated that the tissue was normal choroid plexus. The possibility of the chest tumor being a primary lung carcinoma then was considered. After some discussion it was decided to explore this small tumor since it was felt that some light might be shed on the problem and biopsy of or removal of this mass was considered less hazardous than another craniotomy. Should the lesion have proved to be a lung carcinoma, no further surgical measures on the brain tumor would have been necessary. Accordingly, removal of the chest tumor was done without difficulty. It was reported to be a neurofibrosarcoma of a low-grade of malignancy. Further brain surgery was deferred for the time being. The patient was discharged and has not returned for further study.

Comment: We are still uncertain as to the relationship of the two tumors since the biopsy report on the brain lesion was not helpful. As the majority of cerebello-pontine angle tumors are neurogenic, this may have been one, the small amount of tissue removed not being representative of the tumor itself. The chest lesion was asymptomatic

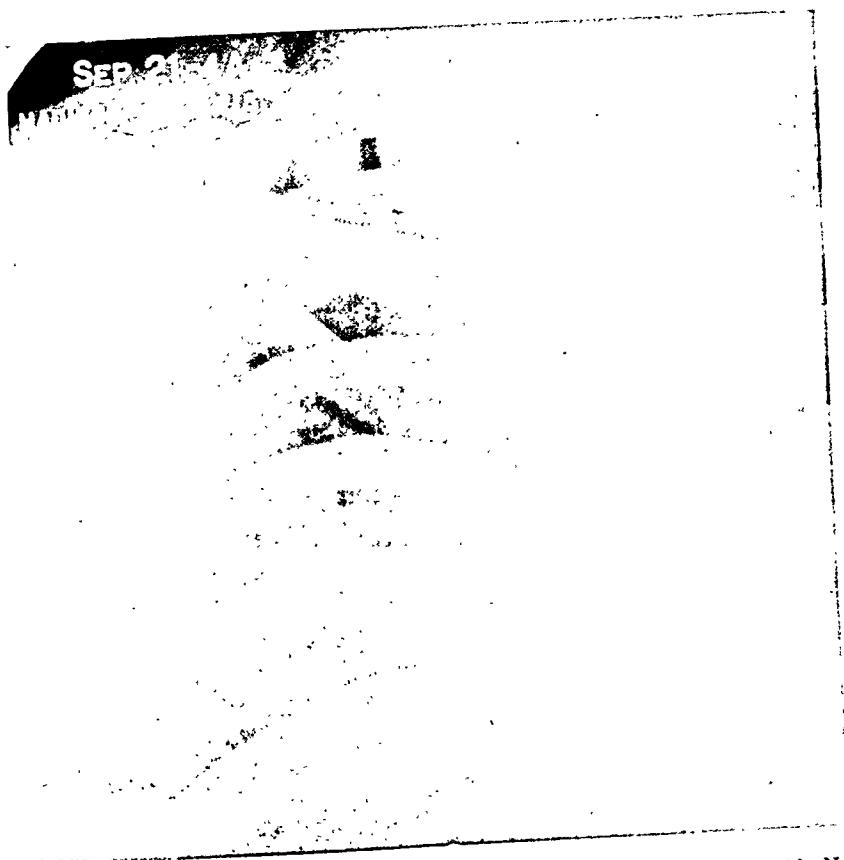


Fig. 6C, Case 4: Final roentgenogram of 9-21-44 (Seven years after A). No change in size.

and of small size yet showed evidence of a low-grade of malignancy. This case emphasizes the importance of early removal of even small neoplasms of this nature since there was nothing in its gross appearance to indicate malignancy.

Case 3: (V. W.). This patient was a 36 year old white female nurse who had a routine employees chest roentgenogram at this hospital for the first time in November, 1940. This demonstrated a small amount of granular infiltration in the right apex and a small, circumscribed mass along the medial aspect of the left apex (Fig. 4A). Investigation of her past history revealed that she had had an intracranial tumor, said to be an acoustic neurinoma, removed nine years previously. Recovery ensued within a year and there had been no symptoms relative to this since. The patient had no complaints at the time of this examination. Since her chest had been roentgenographed while she was an employee elsewhere in 1937, this roentgenogram was obtained. It showed the mass to have been present at that time although only about half as large. Subsequent roentgen examinations were made at intervals, the last on 5/13/43. A slight increase in size of the tumor occurred during this period of observation (Fig. 4B and 4C). At the last clinical examination on January 15, 1943, the patient felt entirely well. Surgical removal of

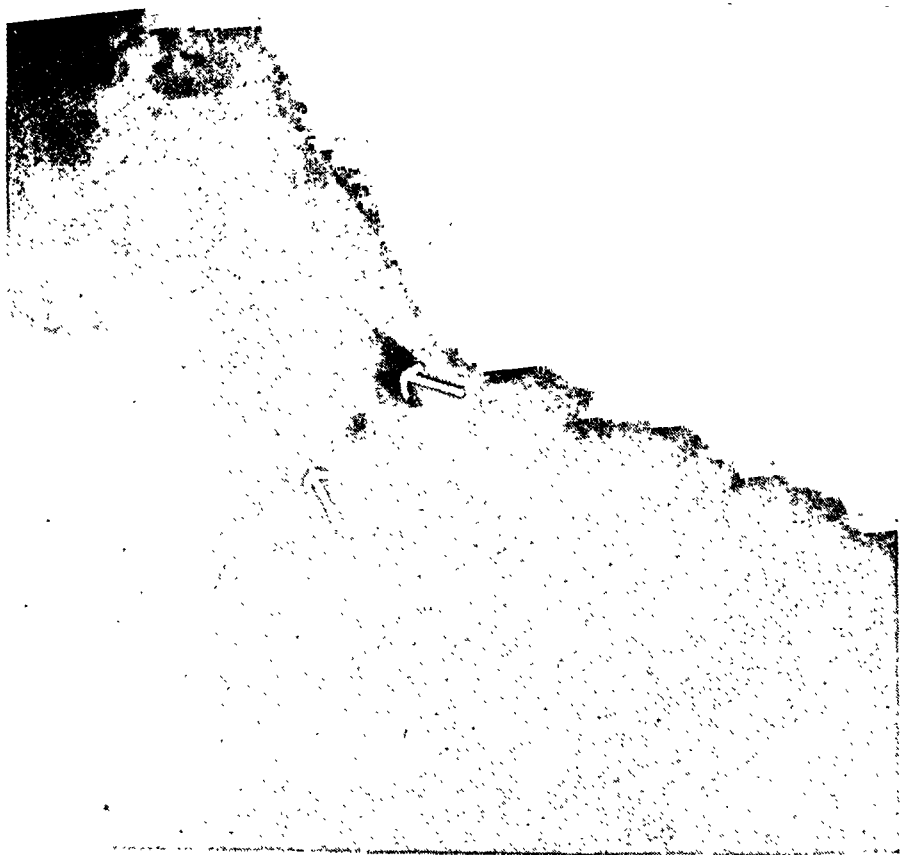


Fig. 7, Case 4: Oblique view showing posterior location of mass adjacent to second and third ribs.

the tumor was considered but the patient did not desire it and operation was deferred (Figs. 5A and 5B).

Comment: While histological study of this tumor has thus far not been possible, all of the evidence indicates that it is of neurogenic origin. The prior operation for an acoustic nerve tumor is of interest in this connection. The multiple occurrence of neurofibromata is well known. Roentgen examination covering a period of six years was available so that the slow growth of the tumor could be followed.

Case 4: (R. H.). This patient was a 32 year old white male, an attendant at another hospital who had a routine employee's chest roentgenogram in August, 1937. It revealed a small tumor mass in the right apex. No detailed physical examination record is available but there were no symptoms from the lesion and he continued to work; subsequent chest roentgenograms were taken in February, 1938; May, 1942; September, 1942, and the final one in September, 1944. During this period of seven years the mass remained stationary in size and appearance (Figs. 6 and 7).

Comment: The roentgen appearance of this lesion, its location and lack of appreciable growth all indicate a benign tumor and it is probably a neurofibroma or similar tumor. The patient has not been desirous of having it removed so that the diagnosis has not been proved.

SUMMARY AND CONCLUSIONS

Neurogenic tumors form a distinct group of intrathoracic neoplasms and are found chiefly along the mediastinal borders. The benign tumors of this class are second only in frequency to the teratoid tumors. A favorite site of development appears to be at the pulmonary apex with the tumor arising from one of the upper intercostal nerves close to the vertebrae.

Clinically these neoplasms cause little in the way of physical signs or symptoms until they become large enough to produce pressure on adjacent structures. The possibility of malignant degeneration is always present and therefore surgical removal is recommended once the diagnosis has been reasonably well established.

Roentgenologically the tumor shadow is sharply circumscribed, rounded or ovoid in shape and located along the medial aspect of the pulmonary apex or at the apical summit. Pressure erosion of ribs or vertebrae may exist but invasive destruction is not seen.

Two cases are reported in which operative removal of the tumor was done. One was a neurofibroma and the other a neurofibrosarcoma of a low grade of malignancy. In addition two other cases are described with similar roentgen findings which were observed over periods of six and seven years respectively but without histological proof of the diagnosis.

Differentiation from the malignant tumors of the pulmonary apex causing Pancoast's syndrome (usually carcinomas of the

lung) is important and is possible when all of the clinical and roentgenologic factors are carefully considered.

RESUMEN Y CONCLUSIONES

Los tumores neurógenos forman un distinto grupo de neoplasmas intratorácicos y se encuentran principalmente a lo largo de los bordes del mediastino. Los tumores benignos de esta clase sólo le van en zaga en frecuencia a los tumores teratoides. El ápice pulmonar parece ser un sitio favorito de desarrollo, con el origen del tumor en uno de los nervios intercostales superiores, próximo a las vértebras.

Desde el punto de vista clínico estos neoplasmas causan pocos signos físicos o síntomas hasta que lleguen a ser lo suficiente grandes para producir presión sobre las estructuras adyacentes. Existe siempre la posibilidad de degeneración maligna y, por lo tanto, se recomienda la extirpación quirúrgica tan pronto como el diagnóstico se haya establecido razonablemente bien.

Desde el punto de vista roentgenológico la sombra del tumor aparece claramente circunscrita, de forma redondeada u ovoide y situada a lo largo del aspecto medio del ápice pulmonar o en la cúspide del ápice. Puede existir erosión de costillas o vértebras debido a presión, pero no ocurre la invasión destructiva.

Se informa sobre dos casos en los que se llevó a cabo la extirpación quirúrgica del tumor. El uno fue un neurofibroma y el otro un neurofibrosarcoma de bajo grado de malignidad. Se describe también otros dos casos con hallazgos roentgenológicos semejantes que fueron observados por períodos de seis y siete años, respectivamente, pero sin prueba histológica del diagnóstico.

Es importante diferenciar estos tumores de los tumores malignos del ápice pulmonar que causan el síndrome de Pancoast (generalmente carcinomas del pulmón) y esto es posible cuando se consideran cuidadosamente todos los factores clínicos y roentgenológicos.

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Intrathoracic Metallic Foreign Bodies

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There is an extensive literature dealing with the immediate problems, both diagnostic and therapeutic, of penetrating injuries of the thorax, but only a rather sparse amount of information on the *late* behaviour and appearance of intrathoracic metallic foreign bodies.^{2,4,5,12,13} In view of the large number of persons who have survived in the recent world conflict with such bodies still retained, it may be timely to review the roentgen findings in a fairly large group of cases, and to consider the detailed data concerning a small number of them.

Surgical textbooks devote very little space to the general subject of pulmonary metallic foreign bodies, or else approach it almost exclusively from the aspect of aspirated objects. For example, in Christopher's well-known book⁴ appears the statement, "Retained foreign bodies introduced from without should be removed, because otherwise they give rise to rapidly spreading infection and result in lung abscess, gangrene, empyema and suppurative mediastinitis." Since no mention is made as to whether the author is referring to aspirated or penetrated foreign bodies, the reader may reasonably assume that he means both. In Lewis' *Practice of Surgery* (1944)¹² there is an extensive amount of data on aspirated foreign bodies in the thorax, but very little on the subject of penetrating objects.

DIAGNOSIS AND CLASSIFICATION

The diagnosis of intrathoracic metallic foreign bodies is usually based on the history, the presence of a scar and, sometimes, on the clinical findings. The history is occasionally misleading, since the patient may have sustained merely a glancing injury to his thorax and the fragment may be subcutaneous in location. The presence of a scar is valuable evidence, but it is to be noted that the absence of one is not exclusive; some sharp, smooth objects such as small calibre bullets may penetrate the thorax and leave virtually no visible wound of entry.⁹ If such object also leaves via the thoracic cage, the wound of exit is, of course, apt to be larger and much more readily visible. The clinical findings in the early stages are well-known; those in the late stages are apt to be

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The opinions set forth in this article are those of the writer and not to be considered as reflecting the policies of the Navy Department.

minimal, except when the patient has been the victim of complicating infection or is aware of the fact that he has a retained projectile.¹

The essential feature in the diagnosis of intrathoracic metallic foreign bodies is naturally the roentgen examination. It should consist of roentgenography in at least two planes (postero-anterior and lateral films, with fairly heavy penetration), followed by such additional projections as are indicated to confirm the location of the object or objects. Tangential "spot" films are especially useful in determining whether the missile lies within or without the lungs. Fluoroscopic examination is essential in many cases, especially with objects near the rib cage or the diaphragm. Heavy penetrated stereoscopic projections are often of value; tomograms may be necessary in some cases to determine the exact location of the fragments, especially if the patient has complicating pulmonary or pleural densities, and there is a question of juxtaposition to certain large bronchi.

Intrathoracic metallic foreign bodies may be classified in accordance with various factors such as number, size, location and so forth. Almost all of them are opaque, despite the extensive use of aluminum in aircraft and similar equipment. From the point of view of the clinician, the important facts regarding foreign bodies are, of course, the presence or absence of associated bleeding and infection, and the amount of nonmetallic material (bone splinters, clothing and other debris) driven in at the time of injury. However, from the point of view of the roentgenologist as well as that of the subsequent compiler of accurate surgical or medical records, we believe that the following data should be made available:

1. Number of opaque foreign bodies;
2. Size,
3. Shape, and
4. Position thereof.
5. Changes (not necessarily related) in adjacent structures:
 - a. Pulmonary and pleural structures,
 - b. Diaphragm,
 - c. Thoracic wall — (soft parts and bones),
 - d. Mediastinum,
 - e. Heart and pericardium.
6. Movement: the movement of bodies, especially those near large cardiovascular areas should be studied fluoroscopically and recorded.
7. Other foreign bodies: adjacent areas such as the neck, shoulders and abdomen should be scrutinized, and the presence or absence of opaque bodies therein noted.

Many cases disclose multiple metallic foreign bodies; in such, only the size of the larger ones or those which are suspected as having potential clinical significance need be recorded. The shape is worth recording since jagged objects are apt to have more associated traumatic and infectious changes than smooth ones. The study of movement in connection with bodies is most important in those lying in or close to the heart and great vessels. However, fluoroscopic examination is always of value, since the existence of some metallic fragments which had been concealed by motion in the roentgenograms may thereby be revealed. Occasionally the problem of differential diagnosis between calcified nodes and metallic foreign bodies arises: in such cases also fluoroscopic examination is of value.

The nature and extent of residual pulmonary changes are often obscured by overlying pleural thickening. Fine scar tissue tracts may be visible in one film and not in another. Some metallic foreign bodies, notably slender, smooth, sharp-pointed ones, may migrate. Bullets and larger fragments will occasionally lie free in the pleural space; we have seen two cases in which considerable doubt arose as to the veracity of previous reports merely because roentgen examination had been made at one station with the patient erect and at another with him horizontal; the bullet lay at the apex one time, and at the base of the pleural cavity the second.

In connection with the classification of the exact type of foreign body present, the x-ray findings are often not characteristic. Even the personal and clinical data on these cases is difficult to evaluate. Many individuals frankly admit they do not "know what hit them"; others are quite positive that it was a sniper bullet, or a grenade or so forth; the roentgenogram may reveal a jagged piece of metal, later identified by an ordnance expert as something of quite different nature from that which the victim felt sure had hit him. In the stress of emergency medical care many wounds are labelled "gun shot wounds" and this term clings to the patient's record, despite the fact that it was produced by shrapnel, mortar, shell or grenade fragment, or by pieces of metal from nearby objects.^{8*}

LOCALIZATION

The simplest means for the localization of the vast majority of intrathoracic metallic foreign bodies is ordinary teleroentgenographic examination in two planes (usually P. A. and lateral),

*In the African campaign (1941-43) Nicholson and Scadding encountered the following retained foreign bodies in a series of 291 cases of penetrating chest wounds: bullet 24, shell 131, mine 10, bomb (mostly mortar) 51.

supplemented by tangential or stereoscopic views as indicated. Should there be any medical or surgical indication for removal of the foreign body, the patient may be placed under the fluoroscope in the same position that he will occupy on the operating table and the exact location of the body marked on the skin in two planes, at right angles to each other. The simplest method is to use a sterile needle and place small scratch marks on the skin which will survive subsequent preoperative preparation. Other methods include the subcutaneous injection of a little dye, the insertion of sterile clips or needles and so forth.

Should associated injuries or other considerations prevent placing the patient in two different planes, various other methods of localization including stereoscopy, parallax, triangulation and so on may be resorted to. In actual practice these are rarely necessary in connection with the types of case reviewed in this paper (See Table I).

TABLE I
Location of *Removed* Intrathoracic
Metallic Foreign Bodies (Recently Reported)

<i>Location</i>	<i>Nicholson and Scadding</i>	<i>d'Abreu et al.</i>	<i>Tuttle et al</i>
Pulmonary	7	25	44
Pleural	14	14	
Diaphragmatic			
Mediastinal	5	4	5
Endothoracic Fascia		4	
Cardiac	1		
Pericardiac		3	3
Vertebral Body	1		
TOTAL	28	50	52

ROENTGEN FINDINGS

The late roentgen findings in relation to intrathoracic metallic foreign bodies are quite variable. Some patients who have had severe penetrating through-and-through injuries of the chest, with a sucking pneumothorax, etc., may have one or two residual intrapulmonary fragments and no other significant changes; scarring may be so minimal that it is only visible in the most perfect of stereoscopic roentgenograms.^{9,15} On the other hand, a small jagged fragment which happened to sever an intercostal

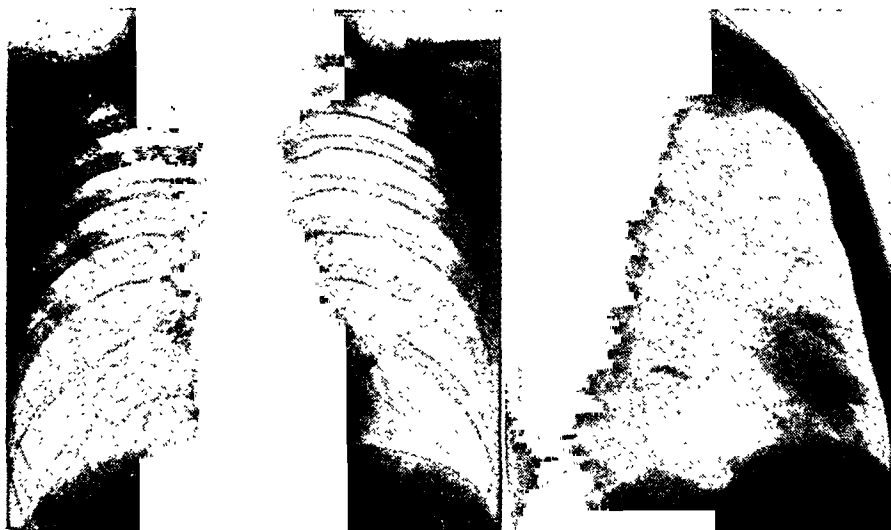


Figure 1A

Figure 1B

Figure 1. (Case No. A2597): *Large, irregular intrapulmonary foreign body (bomb fragment).* Aviation Machinist's Mate, age 24, blown overboard aircraft carrier in March, 1945. Original diagnosis: Multiple wounds of chest and left lower leg, with compound fracture of tibia; rupture of left tympanic membrane. Hemopneumothorax.—Physical examination, July, 1945: Multiple healed shrapnel wounds over chest; healed incisional scar over the right tenth intercostal space and healed wound over the right seventh rib, anteriorly. No pulmonary findings.—X-ray (July, 1945): Metallic foreign body, 16x8x25 mm. in mid-portion of left lower lobe, without visible surrounding reaction; minimal thickening of some of the pulmonary markings in a small portion of this lobe.—Course: Complete resolution of hemopneumothorax; no chest symptoms at present time; patient sent on convalescent leave.



Figure 2A

Figure 2B

Figure 2C

Figure 2. (Case No. A1923): *Large, irregular intrapulmonary foreign body (shell fragment).* No significant pulmonary reaction now visible, despite fragment traversing the entire lower lobe and half of the adjacent middle lobe. Sergeant, age 26, wounded on board ship, March, 1945.—Physical examination, June, 1945: Negative, except for a scar on the right posterior thoracic wall.—X-ray (May, 1945): Metallic foreign body, 19x6x13 mm. in anterior portion of right middle lobe, without surrounding pulmonary reaction; slight pleural thickening around the inferior and lateral aspect of this lobe.—Course: Uneventful; returned to duty, June, 1945.

of blood vessels, recurrence of infection and the development of herniae (phrenic, mediastinal, etc). Pleural irritation, phrenic nerve pressure and so forth may also eventuate. Forsee et al.⁷ describe pulmonary suppuration as a late complication of retained foreign bodies. We have seen no such instance.

Smooth slender objects may migrate and cause subsequent pleural, pericardial or other visceral disturbances, potentially grave. Therefore, should the patient have, for example, a smooth sharp-nosed bullet in the lung, it might be advisable to consider radiographing his lungs at annual intervals (or sooner if symptomatic) in order to observe early signs of migration.

Foreign bodies composed mostly or largely of lead may disintegrate after many years and be associated with symptoms of lead poisoning; we do not know of recorded instances of such occurring in connection with intrapulmonary objects, but have seen a few cases in connection with intramuscular or intraarticular lead



Figure 3A

Figure 3B

Figure 3. (Case No. A1748): Large, smooth intrapulmonary foreign body (7.30 caliber bullet). Corporal, age 23, wounded on Iwo Jima, February, 1945. The bullet entered the left fourth intercostal space about 3 cm. to the left of the sternum. The patient had slight shock and hemoptysis but no respiratory distress.—Physical examination, April, 1945: Negative, except for the presence of a small healed scar at the point of entry.—X-ray (April, 1945): Bullet, about 30 caliber size, in right upper lobe near hilum, without visible surrounding reaction; fluoroscopic examination discloses no vigorous movement of this bullet; it is therefore presumably not in close relation to a large vessel.—Course: This patient had few symptoms and underwent prompt healing, despite the fact that the bullet must have traversed the mediastinum before ending up in the right upper lobe. He was ready for duty one month after the incident, but was returned to the continental limits for final study and disposition.

fragments. On the whole, this contingency must be extremely remote, since numerous persons have had small pieces of lead shot in their tissues for several decades and never shown clinical evidence of lead poisoning.

Erosion of blood vessel wall appears to be quite uncommon. We have seen one case of late, massive (and fatal) hemoptysis in a patient with a small intrapulmonary metallic fragment. The episode occurred following spontaneous rupture of a vessel wall damaged presumably by the passage of the object; at necropsy the latter did not lie near the torn vessel, and therefore the incident *cannot* be ascribed to the continued presence of the metallic foreign body in the lung.

One of the complications of penetrating injury reported in recent years is *extrapleural hemothorax*. In late cases such is rarely evident and would be difficult to differentiate such from intrapleural bleeding, pleural thickening and so forth. However, in early cases the following characteristics of extrapleural hemothorax have been reported: The effusion is almost always localized to a portion of the chest wall, and not spread diffusely up



Figure 4A



Figure 4B



Figure 4C

Figure 4. (Case No. A1721): Large, smooth subpleural (? phrenic) foreign body—30 caliber bullet. Corporal, age 22, wounded at Iwo Jima, February, 1945. The bullet entered the left lower anterior chest about 2 cm. lateral to the midsternal line, at the sixth intercostal space; it presumably traversed the left lobe of the liver and the hemidiaphragm. Patient was unconscious for three days; had a bloody sputum for about a week and was given a diagnosis of blast concussion; he was described as moribund on evacuation.—Physical examination, April, 1945: Evidence of left hydro-pneumothorax; healed scar over left lower anterior thorax.—X-ray (April, 1945): Large, smooth metallic foreign body imbedded in or close to the posterior one-third of the left hemidiaphragm; fixation of the latter. Left hydropneumothorax, with about 50 per cent collapse of the lung; dense pleural thickening around left lower lobe, with adhesions. Barium examination of esophagus and stomach revealed no abnormality.—Course: After an initial stormy period, with massive hemothorax, he slowly improved. He was given much oxygen, plasma, penicillin, and so forth; he developed some complications, including apparent rupture of a left subphrenic abscess into the splenic flexure of the colon. In September, 1945, he was convalescent and in good shape.

or down. Its margin may arise gently or abruptly; in the latter instance it may give the appearance of overhanging at its inferior margin. Such a lesion will indent the lungs, sometimes for several centimeters. When located in a region such as the apex, it has a tendency to overlie the lung like a cap. It varies in size from a small "blister" to a large rounded collection, as much as 15 cm. in diameter. There is almost always some damage to adjacent ribs. Some cases may, of course, be accompanied by an intrapleural effusion or hemothorax.

A possible development which we have not experienced is the production of intrapulmonary arterio-venous fistula—from early or late erosion of the walls of adjacent pulmonary vessels.

REMOVAL

The question of the late removal of foreign bodies is apparently difficult to decide, despite the fact that most appear to be innocuous. Some authors^{2,13} now believe that those in the outer two-thirds of a lung may be left alone, while those more centrally located should, in general, be removed. Antral (hilar), mediastinal and cardiac foreign bodies are more apt to be fatal and hence much less commonly seen than the first mentioned type.

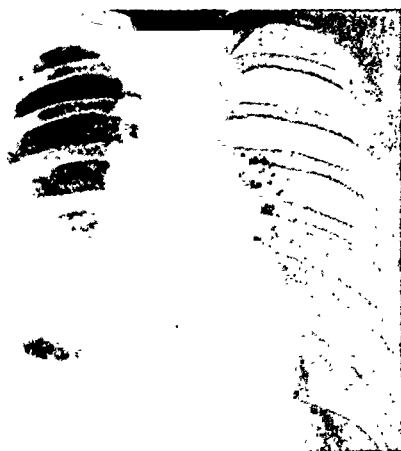


Figure 5A

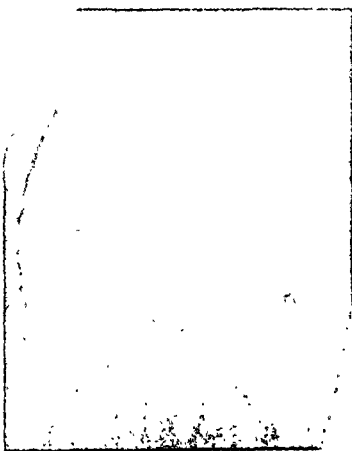


Figure 5B

Figure 5. (Case No. A1777): Small, smooth intrapulmonary foreign body (grenade fragment). Corporal, age 24, wounded by hand grenade in February, 1945. Developed hemothorax and hemoptysis, probably due to an associated rib fracture.—Physical examination, April, 1945: Multiple scars in right lower and posterior thoracic wall; physical findings of right pleural thickening.—X-ray (April, 1945): Three minute metallic foreign bodies in the posterior portion of the right lower lobe; multiple metallic fragments in the thoracic wall, right lower lateral and posterior. Pleural thickening, right parietal and basal. Healing fracture of right eighth rib in posterior-axillary line.—Course: His hemothorax was tapped only once and his bloody sputum ceased within a week. Convalescent in June, 1945.

that "size alone is not a reliable criterion on which to base the decision to remove a foreign body," and yet add "obviously, the large shell fragment should be removed". Of 30 patients with intrapulmonary shell fragments observed at Walter Reed General Hospital, 16 were subjected to surgical removal thereof. Of these only 12 showed "definite signs or symptoms which could be attributed to the foreign body," while 4 showed symptoms "probably psychosomatic in origin". In the remaining 14 cases in which operation was not advised the fragments "were small, in most instances multiple, and the patients had no complaints".

After observing the late cases reported in this article, it is our impression that the vast majority of intrapulmonary metallic foreign bodies do not require removal. In passing, it is rather curious but interesting to note that several authors^{5,10} report that calcified nodes may easily be mistaken for metallic foreign bodies both prior to as well as at operation.

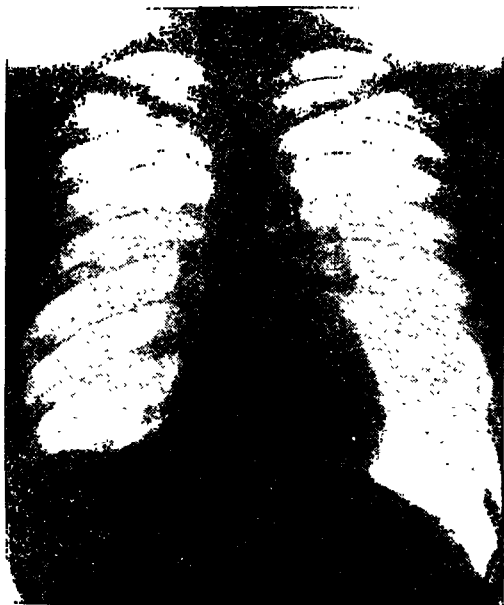


Figure 8A



Figure 8B

Figure 8. (Case No. A2578): Small, irregular extrapulmonary foreign body (bullet fragment). Private, age 23, with gun shot wound of right side of chest sustained at Okinawa, June, 1945.—Physical examination, July, 1945: Healed scar, 3 cm. long, on right thoracic wall just below and lateral to the inferior angle of the scapula. Evidence of thickened pleura around right lung.—X-ray (July, 1945): Metallic foreign bodies in subcutaneous tissues behind and on right side of 10th and 11th thoracic vertebral bodies; thickening of the markings (scarring ?) in right middle and lower lobe; thickened pleura around these lobes.—Course: Immediately after injury, the patient's wound was debrided but the pleura not entered. He had hemoptysis for two days and x-ray evidence of right hemothorax, but no thoracentesis done. Clinically well in August, 1945, and sent on convalescent leave.

ILLUSTRATIVE CASES

The roentgenograms of a series of ten illustrative cases with intrathoracic metallic foreign bodies and penetrating wounds of the thorax are reproduced with this paper. The legends attached to the prints give the essential clinical and roentgenological data on all cases and, for purposes of brevity, these data will not be repeated in the text. Nine of the ten cases shown had, at the time of our particular roentgen examinations, normal blood counts, normal sedimentation rates, negative urine findings and negative laboratory findings of other types. Only one case, No. A1721, who had a residual hydropneumothorax, showed an elevated white count and a slightly increased sedimentation rate at the time of our examination.

SUMMARY

Intrathoracic (pulmonary) metallic foreign bodies are frequently innocuous, especially in the late stages (three or more months following injury).

These foreign bodies may have little or no associated pleural or

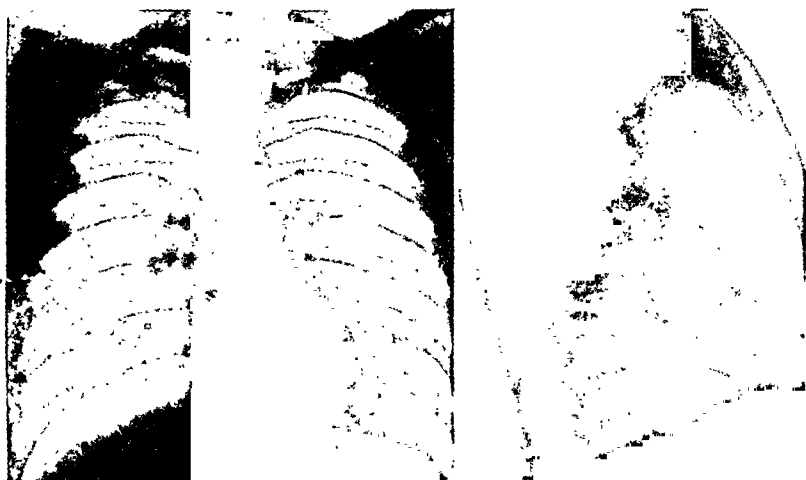


Figure 9A

Figure 9B

Figure 9. (Case No. A1885): Penetrating, through-and-through lung injury (bullet). Private, age 21, was sustained a gun shot wound of the chest at Two Jima in March, 1945. Bullet entered left chest in posterior-axillary line near inferior angle of scapula, emerging near the mid-line posteriorly.—Physical examination, May, 1945: Small, healed scar in left lateral and posterior thoracic region. Evidence of pleural thickening at the left base.—X-ray (May, 1945): No metallic foreign body visible; lungs clear; slight posterior elevation of left hemidiaphragm presumably due to adhesions. Healing or healed fracture of left ninth rib.—Course: Patient developed a left hemothorax after the injury, requiring multiple thoracenteses and transfusions. The intercostal artery was presumably severed. Complete recovery by June; returned to duty in July, 1945.

pulmonary scarring, and, even though in close proximity to a large bronchus, often have no associated pulmonary symptoms.

The necessity for removing most metallic intrapulmonary fragments merely because they measure 1 cm. or more in diameter is not borne out by the series of cases reported herewith.

Organic material (notably bone fragments) driven into the lung at the time of injury, is apparently a much greater source of potential trouble than the metallic foreign body itself.

RESUMEN

Los cuerpos extraños metálicos intratorácicos (pulmonares) son frecuentemente inocuos, especialmente en los periodos avanzados (tres meses o más después del traumatismo).

Estos cuerpos extraños pueden estar acompañados de poca o de ninguna cicatrización pleural o pulmonar y, aun cuando están muy próximos a un bronquio grande, frecuentemente no causan ningún síntoma pulmonar.



Figure 10A



Figure 10B

Figure 10. (Case No. A1922): Penetrating through-and-through lung injury (bullet). Private, age 22, hit by sniper bullet on Iwo Jima in March, 1945. The bullet entered the chest 3 cm. mesial to the right nipple and ranged downward; no wound of exit could be seen.—Physical examination, July, 1945: Small, healed scar over right anterior chest: healed mid-line abdominal scar: evidence of pleural thickening at right base, anteriorly.—X-ray (July, 1945): No metallic foreign body visible. Right basal pleural thickening especially anteriorly and laterally. Lungs otherwise clear.—Course: The patient given an emergency laparotomy for hemorrhage; laceration of the liver was found and sutured, and a bullet in the peritoneal cavity removed. He showed steady improvement and returned to duty in July, 1945.

(The dotted line in the illustrations indicates the estimated course of the bullet; note the complete absence of pulmonary scarring.)

La necesidad de extraer la mayor parte de los fragmentos metálicos intrapulmonares simplemente porque midan un centímetro o más en diámetro, no se constató en la serie de casos incluidos en este informe.

Materias orgánicas (especialmente fragmentos de huesos) que penetren el pulmón con el cuerpo extraño metálico durante el traumatismo, aparentemente pueden ser causa de mucho más daño que el cuerpo extraño mismo.

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Comments from Other Countries

ARGENTINA

The practice of curative and preventive medicine in the Republic of Argentina has received immense benefits from Roentgen's discovery. The Argentine physicians have contributed to the progress of radiologic diagnosis by means of the application of new procedures and techniques; among others, perirenal insufflation (Carelli), the use of lipiodol in transuterine salpingography (Heuser), in the exploration of the salivary glands (Uslenghi); bronchography by intranasal instillation (Besavill-baso), bronchography by post-lingual instillation (Vaccarezza); operative biliary duct radiography (Mirizzi), anguloscopy (Enquin), diagraphy and recently tomography in metametric sections (Pollitzer), without enumerating numerous signs and radiodiagnostic interpretations.

RAUL F. VACCAREZZA, M.D., F.C.C.P., *Governor*
Buenos Aires, Argentina.

AUSTRALIA

As we commemorate the 50th anniversary of the discovery of the x-ray by Wilhelm Konrad Roentgen, it is with deep gratitude that we humbly do so, as his discovery has been of paramount importance to the whole medical world as a diagnostic aid.

During the second World War mass radiography has been a boon to both the Forces and Civilian population. Portable units have been carried on active service, on land and afloat.

It will continue during the post war period to be one of the most valuable assets which we have.

J. H. BLACKBURN, M.D., F.C.C.P., *Regent*
Queensland, Australia.

Medical men in South Australia are glad of the opportunity of paying tribute to the memory and to the outstanding achievements of Wilhelm Konrad Roentgen. It is difficult at the present time to visualize the state of affairs that existed prior to the advent of x-rays. Diagnosis in many fields of medicine, but perhaps especially in diseases of the respiratory tract, would be a sad and sorry business without the invaluable assistance afforded by radiological examination. Medical progress in Australia has received a tremendous stimulus from the remarkable discovery of this great man.

D. R. W. COWAN, M.D., F.C.C.P., *Governor*
Adelaide, South Australia.

X-ray in Australia is now used with success throughout the length and breadth of this vast land.

Her radiologists, technicians and manufacturers have never wearied

in ~~we~~ doing and a noble band of pioneers gave their lives in sacrifice for suffering mankind.

Through its aid and their skill light has been forced into dark places, and in diagnosis and therapy the standards of the practice of medicine have soared to a point of excellence not envisaged at the turn of the century. In celebrating the 50th Anniversary of Roentgen's discovery, Australia can say that she had been worthy of it.

J. A. MURPHY, M.D.
Waterfall, Australia

From 1920, the x-ray has played an increasingly important role in Australia. A great stimulus to improved technique was provided in 1937 by a visit from the late Dr. Edward C. Jarman of the U. S. A. X-ray apparatus has been very largely American, or American inspired. The X-ray and Radium laboratory created by the Commonwealth Government at Melbourne University has been most helpful in the field of manufacture and in radiotherapy. Australia was one of the first countries to adopt, early in 1940, miniature (35 mm.) photofluorography of the chest as a routine for all recruits to the services.

HILARY ROCHE, M.D., F.C.C.P., Governor
Melbourne, Victoria.

BRAZIL

A new method for utilizing the x-ray examination of the chest was applied for the first time in Brazil by Dr. Manoel de Abreu. This method consists of photographing the fluoroscopic image, thereby making possible a mass examination of the chest. In our country this type of procedure has proved of great value in the early discovery and prophylaxis of pulmonary tuberculosis.

Among the pioneers of roentgenology in Brazil, we find Drs. Dodsworth, Duque Estrada and Manoel de Abreu. The first complete installation for x-ray diagnosis was in the Hospital Santa Casa de Misericordia in Rio de Janeiro in 1927. This was soon followed by a similar complete service which was installed at the General Polyclinic Hospital in Rio. Here too, the first deep x-ray unit was placed in service.

In 1938, with the help of Dr. Mac Dowell, Dr. Manoel de Abreu first applied his method of photographing the fluoroscopic image at the General Polyclinic Hospital of Rio de Janeiro. Shortly after, over one hundred similar installations, both stationary and mobile, were being used throughout Brazil in carrying out mass surveys for the detection of pulmonary tuberculosis. It is hoped that before long the entire population of Brazil will have been x-rayed. At present, it is only by this method that the fight against tuberculosis can be won.

PROFESSOR ALFONSO MAC DOWELL, F.C.C.P., *Regent*
Rio de Janeiro, Brazil.
DR. PAUL MARCHESE and DR. B. GRYNKRAUT
Polyclinic General Hospital
Rio de Janeiro, Brazil.

CANADA

The writer remembers as a boy, seeing a demonstration at the Canadian Institute in Toronto, where the bones in the hand were outlined distinctly by a certain ray produced apparently as an electric current passed through a vacuum in a large glass tube. The paternal parent's comment at that time was, "Son, you will see great value come of this."

In 1916, the Ontario Laennec Society at the invitation of C. F. Parfitt, then of Calydor Sanatorium, Muskoka, came to his institution for their annual meeting. James T. Case, then of Battle Creek Sanitarium, had been advising him concerning his new x-ray plant, presumably with black bass fishing on the side. At that meeting for the first time, we saw chest x-ray plates approaching our present-day perfection.

A very few years later, the same Charles Parfitt was heard to say: "We thought we had developed the technique of the physical examination to such a degree that we were finding the disease very early indeed, but now any good x-ray technician at the cross-roads, can find a small tuberculous lesion even earlier still."

When Canada entered World War II, she commenced taking an x-ray film of every soldier before enlistment. She was the only Allied Country to do so from the start. The story of the finding of 4,000 lesions demonstrable by x-ray in the first 400,000 volunteers, has been told elsewhere in this journal in the past year.

WILLIAM E. OGDEN, M.D., F.C.C.P., *Regent*
Toronto, Ontario.

The 50th anniversary of the discovery of the x-ray by Wilhelm Konrad Roentgen commemorates a great milestone in the practice of medicine and surgery.

Like all the civilized countries of the world, Canada welcomed heartily this new adjunct which revolutionized old conceptions and opened new avenues for study and investigation.

Members of the Canadian medical profession join sincerely and wholeheartedly in expressing a tribute of admiration and appreciation to the memory of Wilhelm Konrad Roentgen, a benefactor of humanity, a great scientist and an outstanding genius.

J. A. COUILLARD, M.D., F.C.C.P., *Governor*
Mont Joli, Quebec.

It will be recalled that during the First World War the physical findings of the chest, percussion and auscultation, were rated of greater importance than the roentgenological examination of the lungs. We were later to find out the fallacy of this view. Many of the recruits undoubtedly had tuberculosis at the time of enlistment, but physical examination alone, carefully as it was given, frequently failed to reveal latent as well as active disease in the lungs. The lesson learned has been taken to heart. At the beginning of the present war, the Department of National Defense wisely decided that all recruits enlisting in the Canadian Army should have an x-ray examination of the lungs before they were admitted to the service. The wisdom of this move is beyond dispute. The technical side of radiology has been vastly improved since the days of the last war, and it has been conclusively

demonstrated again and again in mass surveys, as well as by the hundreds of thousands of examinations on inductees into the army, that the x-ray is the surest method to rule out the presence of tuberculosis in the lungs. There is no question that it will be the accepted practice in the future to have whole communities, sick and well, examined by means of x-ray, for there is where prevention as well as cure has its first and greatest point of attack in the control of tuberculosis.

A. F. MILLER, M.D., F.C.C.P., *Governor*
Kentville, Nova Scotia.

Canada, with other nations, has taken advantage of the improvements in x-ray technique. We need only refer to the appreciation of its value in the examination of recruits in this war as compared with that in 1914-18.

In addition to its varied application in general medicine, the use of miniature films in mass surveys has opened up a new vista in the control and eradication of tuberculosis.

In particular, the introduction of the portable unit has enabled us to examine isolated communities, particularly the Indians, living hundreds of miles from organized districts, thus bringing to a much neglected group the benefits of this wonderful discovery.

HAROLD I. KINSEY, M.D., F.C.C.P., *Governor*
Toronto, Ontario.

COLOMBIA

In the past fifteen years Colombia's plans and aspirations developed around public hygiene, private hygiene and social aid. Among all the methods of diagnosis and control of disease, we can be sure that radiology has come to be indispensable in a short period of time. The greatest benefit in the use of x-ray has been obtained in the early diagnosis of tuberculosis by means of Abreu's radiographic method, in the classification of patients and the control of their treatment with radiography and radioscopy; radiological diagnosis of cancer; and its general use in teaching. It has had a special place in gastroenterology, neurology, orthopedics, urology, gynecology, and, in general, all the centers where we have attempted to do scientific work.

If the x-ray apparatus is so essential in the above-mentioned institutions, then it certainly deserves a prominent place in the offices of the physicians in the private practice of medicine. In Colombia the x-ray is used extensively not only by the physicians in the cities, but also by a large number of our provincial physicians.

CARLOS ARBOLEDA DIAZ, M.D., F.C.C.P., *Governor*
Bogota, Colombia.

COSTA RICA

Costa Rica has had the privilege of using the x-ray since 1904, thanks to the genius of Jose Brunetti, who acquired his knowledge and apparatus in the United States of America.

Its progressive application in all medical fields was fundamental to

the progress of the medical sciences in a manner unequaled by any other technical attainment.

In our specific field of phthisiology, the x-ray enabled us to learn of the development of pulmonary tuberculosis. It has aided us in the medical and surgical treatment of tuberculosis and other chest conditions. The early diagnosis of tuberculosis, which is so essential as a public health measure, and the success of the anti-tuberculosis campaign in our country, would not be possible without the legacy which Wilhelm Konrad Roentgen left to humanity.

RAUL BLANCO CERVANTES, M.D., F.C.C.P., *Governor*
San Jose, Costa Rica.

CUBA

The medical profession in Cuba was quick to grasp the importance of the new methods based on Roentgen's epoch-making discovery. Without doubt, every medical specialty in Cuba owes most of its progress to the x-ray. In the words of our eminent roentgenologist, Dr. Pedro L. Fariñas, we stand ever ready to take advantage of any new discovery in this field in behalf of the sick and suffering.

ANTONIO NAVARRETE, M.D., F.C.C.P., *Regent*
Havana, Cuba.

ECUADOR

The use of the x-ray by physicians in Ecuador dates back to May 24, 1908, when the department "Dario Morla" of the General Hospital of Guayaquil was organized. However, two years before this, Pablo Arturo Suarez in Quinto, and Emilio G. Roca and Juan F. Heinert in Guayaquil, had small equipment for their private practice. The apparatus of the "Dario Morla" was a "Gaiffe," installed and handled by Juan Verdesoto, with Jose Alavedra as an assistant. Since then, modern apparatus has been introduced and modern techniques have been used.

The radiologists who have contributed to the progress of this modern procedure are Verdesoto, Francisco Andrade, Julio Mata, Jorge Illingworth, J. Ricaurte, R. Teran Gostelle and others.

JUAN TANCA MARENGO, M.D., F.C.C.P., *Governor*
Guayaquil, Ecuador.

ENGLAND

It is very seldom that any discovery has a profound effect on every branch of medicine. We have had things like insulin affecting diabetes or liver affecting pernicious anaemia but Roentgen's discovery of X-rays has brought light to every avenue of Medicine and Surgery. With the wonderful improvements which have been made since the original discovery the physician can now see where before he was blind. Such a discovery is more a revolution than a mere advance.

SIR ALEXANDER FLEMING, M.D., F.C.C.P.
London, England.

MEXICO

The enormous advantages for the accurate, rapid and early diagnosis of disease in modern medicine obtained in all our countries by the multiform application of Roentgen rays cannot be over-emphasized.

People all over the world, whether suffering disease or not, cannot realize how much indebted they are to Roentgen. A tremendous number of lives have been saved through the benefit of his discovery.

DONATO G. ALARCON, M.D., F.C.C.P., *Regent*
Mexico City, Mexico.

REPUBLIC OF PANAMA

The advent of roentgenology marks in our country, as for all of humanity, a definite step forward in scientific progress that has made possible greater precision in the study, diagnosis and treatment in many fields of modern medicine.

The benefits received from this achievement continue to increase with the gradual widening of our knowledge of its possibilities, accentuating in this manner, even more, the eternal debt of gratitude we have for its discoverer.

AMADEO VICENTE MASTELLARI, M.D., F.C.C.P., *Regent*
Panama City, Republic of Panama.

PERU

Peru received the benefit of the great discovery of Roentgen in 1896, the year in which Professor Constantino T. Carvallo obtained the first x-ray equipment.

As a symbolical initiation of this event, x-rays were taken of the hands of Mr. Nicolas de Pierola, the first democratic president of Peru, and Mr. Ricardo Palma, the great traditionalist writer.

The first professorship in radiology in our official curriculum started in 1923, and the first professor was Dr. Esteban Campodonico. The present professor in the Nacional University of San Marcos is Dr. Oscar Soto.

Actually, the x-ray is used in Peru in every field of medicine and medical investigation, and the benefit which Peru receives from this discovery confirms our gratitude to the scientific genius of Wilhelm Konrad Roentgen.

OVIDIO GARCIA ROSELL, M.D., F.C.C.P., *Governor*
Lima, Peru.

SOUTH AFRICA

In common with older countries, South Africa has shared fully in the results of Roentgen's great discovery, the jubilee of which we now celebrate. As in the old world, the x-ray has here found its most important scope in the councils of physicians and surgeons. All our large hospitals are fully equipped with diagnostic as well as therapeutic units,

and work of the highest quality is being carried out. The most significant work depending on radiography is that of our Miners' Phthisis (silicosis) Bureau on the Witwatersrand Gold Mines. The correlation of clinical with radiographic findings has provided standards which have become the pattern for similar work in other countries. The striking results in the rapid lowering of the incidence of silicosis (64% in one 10-year period) are attributed to a more thorough understanding of the disease permitted by the use of the x-ray. But in many other directions, in art, in industry, in criminology, the x-ray is an indispensable aid. Our young steel industry and our old diamond mining organization depend upon its help and protection.

Editorial restriction limits this telegraphic form of communication and permits little more than a formal salute from South Africa to the memory and genius of Wilhelm Konrad Roentgen, the discoverer of the x-ray.

DAVID P. MARAIS, M.D., F.C.C.P., *Governor*
Cape Town, South Africa.

SPAIN

In 1896, Dr. C. Comas and Dr. A. Prio made their first attempts with x-ray in Barcelona, Spain. The significance that Wilhelm Konrad Roentgen's discovery has had in the progress of medicine in Spain has been enormous. The broad diffusion of the knowledge of radiology has been evidenced by the numerous International and National Congresses devoted to it since 1911 as well as the creation of Professorships in Radiology. The application of radiology to early diagnosis in pulmonary tuberculosis and the anatomical-clinical and pathogenetic interpretation of tuberculosis has permitted us to reach a progressive improvement in the results of its treatment. The benefits derived from Wilhelm Konrad Roentgen's discovery are incalculable.

LUIS SAYE, M.D., F.C.C.P.
Barcelona, Spain.

UNITED STATES POSSESSIONS

HAWAII

In probably no other field of medicine has the discovery of the x-ray by Wilhelm Konrad Roentgen played such an important part as in diseases of the chest. Without it we would still be unable to detect the presence of tuberculosis until it had reached the stage where treatment is prolonged and difficult.

With its help and particularly that of photofluorography, we are now engaged in a Territorial-wide project whereby every individual over fifteen years of age is being given the opportunity of having a chest x-ray. This will undoubtedly eventually result in having the majority of cases picked up in the early and easily treated stage of the disease.

WILLIAM F. LESLIE, M.D., F.C.C.P., *Governor*
Hilo, Hawaii.

PUERTO RICO

The death rate from tuberculosis in Puerto Rico has come down from 308 deaths per 100,000 population in 1934 to 215 in 1944, a decrease of 30 per cent in ten years. This remarkable lowering of the mortality rate is believed to have been due in large measure to the intensive antituberculosis campaign which was launched in 1934, based largely on the extensive use of the x-ray machine in diagnosis and as a guide in treatment. Before this campaign was started, not more than half a dozen physicians on the island had fluoroscopes in their offices. Now, the fluoroscope has become so popular that the practicing physician who does not own one suffers from an inferiority complex. The public has become used to x-ray examinations of the chest and demands them. The Health Department has fluoroscopes in the more important public health units, and is planning to have this equipment installed in all of them. During the last few years mass x-raying facilities have been on the increase. Two photofluorographic machines are now in use and two more have been ordered. The local antituberculosis association has recommended a plan to take 500,000 miniature films of the chest annually. This would be equivalent to x-raying one fourth of the island's population every year.

Puerto Rico has still the highest tuberculosis mortality under the American flag; but we feel encouraged by the progress of the past and have great faith in the future. Long and hard as is the fight ahead of us, we gain comfort from the fact that we have attained one of the main prerequisites to success in any antituberculosis campaign: we have made physicians and the public, *x-ray conscious*.

J. RODRIGUEZ PASTOR, M.D., F.C.C.P.
Santurce, Puerto Rico.

The discovery by Wilhelm Konrad Roentgen is the starting point of a new era in the history of medical sciences in Puerto Rico.

At the present time the x-ray is widely used in hospitals and private offices both in therapy and diagnosis. The number of lives that have been saved by this great discovery is countless.

Medicine in Puerto Rico, as everywhere else, has been gradually developing special senses. It already has sight in the form of the x-ray machine.

DAVID E. GARCIA, M.D., F.C.C.P., *Regent*
Hato Rey, Puerto Rico.



RALPH CHARLES MATSON

Past President

American College of Chest Physicians

1880 - 1945

RALPH CHARLES MATSON

1880 - 1945

"In the death of Dr. Ralph C. Matson there passed another of those several great physicians of Oregon, each of whom in his time made medical history to the advantage of humanity everywhere. Dr. Matson was an international authority on tuberculosis and chest surgery, and his contributions to this highly specialized science were many. Though to the layman the fact conveys little meaning, editorship of the magazine, "Diseases of the Chest," is to the initiate all the evidence needed of singular and recognized eminence in the indicated field. As editor of this American publication, Dr. Matson's recognition was world wide.

"Perhaps Dr. Matson's greatest benefaction to the Pacific coast residents was his conclusive proof that tuberculosis can be as effectively treated here as in a more favorable climate. One can readily imagine what this proof signified, and still does, to tuberculosis patients of modest means or none whatever. It was more than a reprieve; often it was the way to health again for those who must otherwise have felt themselves under sentence of death.

"Few knew that Dr. Matson, one of the most human of mortals, had been in ill health for several years—while he carried on his practice and research, presenting a cheerful countenance to the world, himself undaunted. It is with deep regret that we consider the departure of Dr. Matson—but with sentiments of profound gratitude to the man and his memory. He kept the faith brilliantly, gently, consistently; he fought a good fight. There is no way to repay him, save to remember."^a

The above quoted from an editorial obituary appearing in the Morning Oregonian, Portland, Oregon, October 30, 1945, is a just appraisal and tender tribute to a great physician. It was written by "a gentleman of the old school" about one of the finest physicians of a great period in medicine. Physician, Surgeon, Soldier, Writer, Teacher, Humanist, "Dr. Ralph" was all these. Paragraphs could be written extolling his prowess in each category. No doubt many will be. His contributions to medical knowledge and particularly to thoracic surgery were many, and the perfection of the technique of intrapleural pneumonolysis has received international acclaim. He was an astute diagnostician, his medical and surgical judgement were keen and accurate, and he combined the two skillfully. His work with the British Expeditionary Force and later with the United States Army during and after the first World War was outstanding.

Many patients who do not know his name are living normal lives because he made collapse therapy an increasingly acceptable and tolerable procedure. Many surgeons now and in the future are indebted to him for his pioneer work in thoracic surgery.

I would like to speak of him as a friend and a teacher. He loved people and life. Life loved Dr. Ralph and gave him an infectious zest and joy. His patients loved him, his students liked and admired him and his colleagues liked, admired and respected him. He was a perfectionist, critical of his own efforts; he could be blunt in his criticism of incompetence or carelessness but had unbounded patience with those sincerely desiring to learn. Everyone tried a little harder, worked a

^aUsed with permission of The Oregonian, Portland, Oregon.

little longer, felt a great pride in accomplishment under the stimulus of his enthusiasm and dynamic personality. A thorough student, an excellent teacher, a great man, he will live long; because talents and skills like his do not die. Every student of medicine who came under his instruction—and they were many during his 42 years of teaching—will remember and keep alive a part of him as he applies a stethoscope to a chest and recalls Dr. Ralph's description and interpretation of the sounds he hears.

Every patient who enters the University State Tuberculosis Hospital in Portland will keep alive a part of him, for the establishment of a State Hospital for the surgical treatment of tuberculosis is the fulfillment of his vision and his efforts.

The University of Oregon Medical School has lost a good teacher—the medical profession has lost a friend. His work and his skill will continue in other hands. He will never be replaced. Grief is tempered with gratitude for having had him with us this long.

JAMES T. SPEROS, M.D.
Portland, Oregon

Chest Physicians Study Co-operation With Army, Navy

All Specialists in U. S. Would Aid Examinations Of Recruits, Under Plan

Plans for co-operating with the Army and Navy in giving physical examinations to those preparing to enter the military service in the event this country becomes involved in the war were discussed yesterday at conferences among medical advisers of the two branches of service, the Veterans' Administration and Murray Kornfeld, executive secretary of the American College of Chest Physicians.

Also taking part in the conferences were Dr. J. Winthrop Peabody, president of the District Tuberculosis Association, and the association's managing director, Mrs. Ernest R. Grant. Dr. Peabody is the only local member of the Military Affairs Committee of the American College of Chest Physicians.

Under contemplated plans all chest specialists of this country would be made available in an

emergency. In addition to 600 member specialists of the college, a survey is to be made to determine the number of other physicians who would be available.

"The Government departments are agreed," Mr. Kornfeld said, "that the present knowledge and most modern methods of diagnosis be utilized in the examinations, and that the progress made since the World War in this Nation's fight against tuberculosis be safeguarded and maintained to its full extent.

"Men with contagious and infectious diseases must be eliminated from military service to prevent further spread. The costly errors of the World War, for which we still are paying nearly \$7,000,000 a year for hospitalization alone, must be avoided. A permanent history record and X-ray pictures of every enlistment must be filed for future reference," Mr. Kornfeld asserted.

"WELL DONE"

The above news clipping reproduced from the Washington Evening Star recalls that the College was in the forefront as early as June, 1940 urging the military authorities to put an x-ray program into effect.

The routine chest x-ray has reduced tuberculosis in our armed forces and it has made the American Public x-ray conscious.

Th. of our government are to be congratulated and insistence on x-ray surveys to protect the health of the nation.

The Council on Military Affairs and Public Health of the American College of Chest Physicians has since brought to the College meeting the leading authorities from the U. S. Army, Navy, Veterans and Public Health Services to discuss the advances made by those Services in their efforts to control tuberculosis. Their reports have been published in "Diseases of the Chest".

Now that the war has been terminated, let us continue this fine practice of encouraging the chest x-ray of all civilians at regular intervals. Herein lies our opportunity for controlling and eventually eliminating tuberculosis.

CHARLES M. HENDRICKS, M.D., *Chairman*
Council on Military Affairs and Public Health.

College News

SEMI-ANNUAL MEETING, BOARD OF REGENTS

The Semi-Annual Meeting of the Board of Regents of the American College of Chest Physicians was held at the Hotel Gibson, Cincinnati, on November 11, 1945. A report of the proceedings of the meeting will be published in the next issue of "Diseases of the Chest".

College Chapter News

SOUTHERN CHAPTER

The Southern Chapter of the College held its annual meeting in conjunction with the annual meeting of the Southern Medical Association at Cincinnati on November 12, 1945. The following program was presented:

9:00 A. M. — *Scientific Session*

David W. Heusinkveld, M.D., F.C.C.P., Cincinnati, Ohio, presiding.

"Fifteen Years' Experience with Carbon Dioxide in the Management of Cough," Andrew L. Banyai, M.D., F.C.C.P., Wauwatosa, Wisconsin.

Discussion opened by Karl Schaffle, M.D., F.C.C.P., Asheville, North Carolina, and Walter E. Vest, M.D., F.C.C.P., Huntington, West Virginia.

"Lobectomy and Pneumonectomy in Pulmonary Tuberculosis," Duane Carr, M.D., F.C.C.P., Memphis, Tennessee, and John S. Harter, M.D., F.C.C.P., Louisville, Kentucky.

"Pulmonary Resection for Tuberculosis"—With Slides and Motion Pictures, Richard H. Overholt, M.D., F.C.C.P., Brookline, Massachusetts.

Discussion of the above two papers opened by Maurice G. Buckles, M.D., F.C.C.P., Louisville, Kentucky, and Richard Kyle Brown, M.D., F.C.C.P., Greenville, South Carolina.

British Sound Film "Surgery in Chest Diseases," loaned by the British Information Services, Atlanta, Georgia.

12:30 P. M. — *Hotel Gibson*

Luncheon Meeting, Southern Chapter, American College of Chest Physicians, Alvis E. Greer, M.D., F.C.C.P., Houston, Texas, President, presiding.

Business Meeting, Reports of Committees, Election of Officers.

2:00 P. M. — *Scientific Session*

H. I. Spector, M.D., F.C.C.P., St. Louis, Missouri, presiding.

"A New Concept of the Treatment of Allergy,"—With Special Reference to the Treatment of Asthma and Migraine, W. Merritt Ketcham, M.D., Kansas City, Missouri.

Discussion opened by Carl C. Aven, M.D., F.C.C.P., Atlanta, Georgia and Dean B. Cole, M.D., F.C.C.P., Richmond, Virginia.

"The Geographical Distribution of Histoplasmin Sensitivity," M. L. Furcolow, M.D., Kansas City, Kansas.

"Histoplasmin Sensitivity in Relation to Pulmonary Calcification."
Henry B. Zwerling, M.D., Bethesda, Maryland.

Discussion of above two papers opened by Herbert L. Mantz, M.D.,
F.C.C.P., Kansas City, Missouri, and Myron D. Miller, M.D., F.C.C.P.,
Columbus, Ohio.

"Pulmonary Coccidioidomycosis," Captain H. E. Bass, F.C.C.P., Burns
General Hospital, Santa Fe, New Mexico.

Discussion opened by Captain H. R. Barnes, F.C.C.P., Denver, Colo-
rado, and Merle D. Bonner, M.D., F.C.C.P., Jamestown, North Carolina.

7:00 P.M. — *Hotel Gibson*

Dinner Meeting, Charles M. Hendricks, M.D., F.C.C.P., El Paso, Texas.
President-Elect, American College of Chest Physicians, presiding.

President's Address, Alvis E. Greer, M.D., F.C.C.P., Houston, Texas,
President, Southern Chapter.

X-ray Conference, John M. Preston, M.D., F.C.C.P., Columbia, South
Carolina, Conductor.

Officers and Committees

Southern Chapter

American College of Chest Physicians

President, Alvis E. Greer, M.D., F.C.C.P., Houston, Texas

First Vice-President, Carl C. Aven, M.D., F.C.C.P., Atlanta, Georgia

Second Vice-President, Paul A. Turner, M.D., F.C.C.P., Louisville,
Kentucky

Secretary-Treasurer, Benjamin L. Brock, M.D., F.C.C.P., Waverly Hills,
Kentucky

Program Committee

Paul A. Turner, M.D., F.C.C.P., Louisville, Kentucky, *Chairman*

Herbert L. Mantz, M.D., F.C.C.P., Kansas City, Missouri

Karl Schaffle, M.D., F.C.C.P., Asheville, North Carolina

John M. Preston, M.D., F.C.C.P., Columbia, South Carolina

Medical Education Committee

R. G. McCorkle, M.D., F.C.C.P., San Antonio, Texas, *Chairman*

Wm. Atmar Smith, M.D., F.C.C.P., Charleston, South Carolina

George R. Meneely, M.D., F.C.C.P., Nashville, Tennessee

Membership Committee

Carl C. Aven, M.D., F.C.C.P., Atlanta, Georgia, *Chairman*

Hollis E. Johnson, M.D., F.C.C.P., Nashville, Tennessee

H. I. Spector, M.D., F.C.C.P., St. Louis, Missouri

General Arrangements Committee

Benjamin L. Brock, M.D., F.C.C.P., Waverly Hills, Kentucky, *Chairman*

James L. Mudd, M.D., F.C.C.P., St. Louis, Missouri

W. F. Rienhoff, Jr., M.D., Baltimore, Maryland

Sidney Jacobs, M.D., F.C.C.P., New Orleans, Louisiana

Jesse Dean Riley, M.D., F.C.C.P., State Sanatorium, Arkansas

Sam E. Thompson, M.D., F.C.C.P., Kerrville, Texas

Local Arrangements Committee

John H. Skavlem, M.D., F.C.C.P., Cincinnati, Ohio, *Chairman*
James N. Christiansen, M.D., F.C.C.P., Cincinnati, Ohio
David W. Heusinkveld, M.D., F.C.C.P., Cincinnati, Ohio
William H. Lippert, M.D., F.C.C.P., Cincinnati, Ohio
Louis B. Owens, M.D., F.C.C.P., Cincinnati, Ohio
Charles M. Siegel, M.D., F.C.C.P., Cincinnati, Ohio
*Charles J. Farrell, M.D., F.C.C.P., Covington, Kentucky

*Chairman, Housing Committee.

ROCKY MOUNTAIN CHAPTER

The Rocky Mountain Chapter of the American College of Chest Physicians held its annual meeting at Denver, Colorado in conjunction with the annual meeting of the Colorado State Medical Society on September 19, 1945. The following program was presented:

9:00 A. M.

Pulmonary Coccidioidomycosis, Captain H. R. Barnes, F.C.C.P.
Pregnancy Complicated by Tuberculosis, Major E. A. Mechler.
Resection for Pulmonary Suppurative Disease, Captain C. B. Craft.
X-ray Studies in Unusual Chest Conditions, Major D. A. Dowell.

Noon — Luncheon and Business Meeting

Col. John B. Grow, MC, F.C.C.P., presiding
Guest Speaker, Minas Joannides, M.D., F.C.C.P., Chicago, Illinois.

Afternoon Meeting — 2:00 P. M.

British Sound Film, "Surgery in Chest Diseases," loaned by the British Information Services, Chicago, Illinois.
Actinomycosis of the Lungs, Captain H. E. Miller.
Diseases of the Esophagus, Major Herbert W. Schmidt.
Pulmonary Resection in Tuberculosis, Lt. M. L. Bradford.
Care of Recent Battle Wounds of the Chest, Major D. A. Mulvihill.
All of the speakers on the scientific program were from Fitzsimons General Hospital, Denver, Colorado.

Officers

Colonel John B. Grow, MC, F.C.C.P., Denver, Colorado,
President.
Carl H. Gellenthien, M.D., F.C.C.P., Valmora, New Mexico,
First Vice-President.
William C. Walker, M.D., F.C.C.P., Salt Lake City, Utah,
Second Vice-President.
W. Bernard Yegge, M.D., F.C.C.P., Denver, Colorado,
Secretary-Treasurer.

Regent, District No. 10

George B. Gilbert, M.D., F.C.C.P., Colorado Springs, Colorado.

Governors

Colorado: Arnold Minnig, M.D., Denver.

Utah: William C. Walker, M.D., Salt Lake City.

New Mexico: William H. Thearle, M.D., Albuquerque

Wyoming: H. R. Kanable, M.D., Basin.

*Committees**General Arrangements Committee*

W. Bernard Yegge, M.D., F.C.C.P., *Chairman*

G. Burton Gilbert, M.D., F.C.C.P.

William C. Walker, M.D., F.C.C.P.

John A. Cremer, M.D., F.C.C.P.

Nominating Committee

Arnold Minnig, M.D., F.C.C.P., *Chairman*

Charles Bundsen, M.D., F.C.C.P.

Aidan M. Mullett, M.D., F.C.C.P.

Reception and Entertainment Committee

Carl H. Gellenthien, M.D., F.C.C.P., *Chairman*

Alexius M. Forster, M.D., F.C.C.P.

John G. Wolf, M.D., F.C.C.P.

Maurice Chernyk, M.D., F.C.C.P.

Capt. H. M. Van der Schouw, M.D.

Scientific Program Committee

Colonel John B. Grow, MC, F.C.C.P., *Chairman*

Colonel G. F. Aycock, MC, F.C.C.P.

B. T. McMahon, M.D., F.C.C.P.

Capt. John G. Graham, MC.

Arthur Rest, M.D., F.C.C.P.

At the business session of the chapter, the following resolution was adopted: "The Rocky Mountain Chapter wishes to go on record as recommending to the Board of Regents of the American College of Chest Physicians the establishment of a Board of Diseases of the Chest, certifying specialists limiting their practice to chest diseases, without the requirement that they first be certified by the American Board of Internal Medicine."

Officers for the year 1945-1946 were elected. They are:

Carl H. Gellenthien, M.D., President

William C. Walker, M.D., First Vice-President

Capt. H. M. Van der Schouw, Second Vice-President

*W. Bernard Yegge, M.D., Secretary-Treasurer

*Re-elected.

Dr. Carl H. Gellenthien, President of the Rocky Mountain Chapter of the College announced the following committee appointments:

Membership Committee

W. B. Yegge, M.D., 227 16th St., Denver, Colorado, *Chairman*
C. D. Anton, M.D., 15 East Works St., Sheridan, Wyoming
A. M. Mullett, M.D., 23 E. Pikes Peak Ave., Colorado Springs, Colo.
I. D. Nelson, M.D., Indian San., Albuquerque, New Mexico
W. C. Walker, M.D., 829 Boston Bldg., Salt Lake City, Utah

Program Committee

Col. John B. Grow, Fitzsimons Gen. Hosp., Denver, Colo., *Chairman*
Robt. O. Brown, M.D., Sena Plaza, Santa Fe, New Mexico
Col. R. M. Hardaway, Bushnell Gen. Hosp., Brigham City, Utah

Public Relations Committee

Allan Hurst, M.D., Nat'l. Jewish Hosp., Denver, Colorado, *Chairman*
H. C. Jernigan, M.D., 106 S. Girard St., Albuquerque, New Mexico
Wm. R. Rumel, M.D., 54 E. South Temple, Salt Lake City, Utah

INDIANA CHAPTER

The Indiana Chapter of the American College of Chest Physicians held its annual meeting in connection with the annual meeting of the Indiana State Medical Society at French Lick, Indiana on November 6, 1945. The following program was presented:

Guest Speaker: Jerome R. Head, M.D., F.C.C.P., Chicago, Illinois, "Lung Resection in Pulmonary Tuberculosis."

This was followed by an x-ray conference and business meeting of the Chapter. The Tuberculosis Committees of the state and county medical societies in Indiana were invited to attend the meeting.

NEW YORK STATE CHAPTER

The following resolution was introduced by Dr. Nelson W. Strohm, F.C.C.P., Buffalo, Regent of the College for New York State, before the House of Delegates of the Medical Society of the State of New York and adopted:

WHEREAS: At the 1941 meeting of the House of Delegates a resolution by the House of Delegates recommending a symposium on chest diseases was approved and

WHEREAS: Such a symposium was given on chest diseases at a general session of the annual convention in 1942 and

WHEREAS: This general session was enthusiastically attended and appreciated, indicating the definite interest of the medical profession in the subjects presented and

WHEREAS: A certain chest disease, namely, tuberculosis, has almost become the forgotten disease and

WHEREAS: This disease which is the most common of all chronic chest diseases and is very amenable to care and treatment,

THEREFORE, BE IT RESOLVED: That the House of Delegates of the Medical Society of the State of New York establish a session on chest diseases for the next annual meeting.

ILLINOIS CHAPTER

The officers of the Illinois Chapter of the American College of Chest Physicians met in executive session at the Edgewater Beach Hotel, Chicago, October 9, 1945. The following officers and guests attended the meeting:

Officers

Fred M. F. Meixner, M.D., Peoria, President
Arthur S. Webb, M.D., Glen Ellyn, Secretary-Treasurer
Otto C. Schlack, M.D., Oak Forest, Past President
Minas Joannides, M.D., Chicago, Past President
Otto L. Bettag, M.D., Pontiac, Member
Kenneth G. Bulley, M.D., Aurora, Member
Paul H. Holinger, M.D., Chicago, Member
Edwin R. Levine, M.D., Chicago, Member

Guests

H. I. Spector, M.D., St. Louis, Missouri, Regent
Edward W. Custer, M.D., South Bend, Indiana

Dr. Webb introduced a motion that a two-day scientific program be presented by the Illinois Chapter of the College in connection with the 1946 annual meeting of the Illinois State Medical Society. The motion was seconded by Dr. Schlack and passed. Dr. Meixner appointed the following physicians to the Scientific Program Committee:

Kenneth G. Bulley, M.D., Aurora, *Chairman*
Otto L. Bettag, M.D., Pontiac
Edwin R. Levine, M.D., Chicago

The Committee was authorized to make all arrangements for the preparation and presentation of the scientific program for this meeting. It was further stipulated that invitations be extended to the members of the Indiana, Missouri and Wisconsin Chapters of the College to attend and participate in the meeting.

Dr. Levine proposed that the Illinois Chapter sponsor a postgraduate course at Chicago on diseases of the chest and the proposal was seconded by Dr. Holinger. The following committee was appointed to study this proposal and to submit a report to the Illinois Chapter at the next annual meeting:

Edwin R. Levine, M.D., Chicago, *Chairman*
Paul H. Holinger, M.D., Chicago
Minas Joannides, M.D., Chicago

Dr. Webb, Secretary of the Chapter, was appointed by the President to serve on all chapter committees.

NEW JERSEY CHAPTER

A delegation from the New Jersey Chapter of the American College of Chest Physicians attended the dedication of a library at the New Jersey State Tuberculosis Sanatorium, Glen Gardner, as a tribute to Dr. Samuel B. English, F.C.C.P., Medical Director of the Sanatorium. The New Jersey Chapter of the College made a contribution to the library fund.

PERUVIAN CHAPTER

The Peruvian Chapter of the American College of Chest Physicians held its annual meeting at the Asociacion Medica Peruana, September 13-15, 1945. The following scientific program was presented:

September 13

- "Funcion social del medico en la lucha antituberculosa," Prof Ovidio Garcia Rosell, M.D., F.C.C.P.
"Problema asistencia del tuberculoso en el Hospital 'Daniel Carrion,' Callao," Luis E. Hubner, M.D., F.C.C.P.
"Investigacion del ambiente familiar de los niños internados en Collique," Pedro Zevallos A., M.D.
"Investigacion tuberculino-radiologica en grupo de embarazadas," Leopoldo Molinari Balbuena, M.D., F.C.C.P.
Preguntas y respuestas.

September 14

- "Imagenes radiologicas pseudo tuberculosas," Prof. Juan A. Werner, M.D., F.C.C.P.
"Cuerpos fibrinosos intrapleurales en el curso del pneumotorax," Max Espinosa Galarza, M.D., F.C.C.P.
"Bronquiectasias en los niños," Horacio Cachay Diaz, M.D.
"Resultado del tratamiento por pneumo-serosa," Victor M. Tejada, M.D., F.C.C.P.
"Resultados en algunos casos de seccion de adherencia," Mario Pastor B., M.D.
Preguntas y respuestas.

September 15

- "Estadistica sobre tuberculosis en algunos departamentos de la Republica," Luis Cano Girona, M.D., F.C.C.P.
"Lues y tuberculosis—caso clinico," Juan Escudero Villar, M.D., F.C.C.P.
"Disgenesias bronco-alveolares," Ramon Vargas Machuca, M.D., F.C.C.P.
"Aneurisma de la arteria pulmonar," Victor Narvaez, M.D.
Preguntas y respuestas.
Instalacion de la nueva junta Directiva.

The following officers were elected:

- President, Max Espinoza Galarza, M.D., F.C.C.P.
Vice-President, Luis Cano Girona, M.D., F.C.C.P.
Secretary, Ramon Vargas Machuca, M.D., F.C.C.P.,
Treasurer, Luis E. Hubner, M.D., F.C.C.P.

Professor Ovidio Garcia Rosell, F.C.C.P., Governor of the College for Peru and President of the 7th Congreso Pan-Americano de la Tuberculosis (ULAST), visited Chile, Argentina, Bolivia and Uruguay in connection with the organization of the Congress which is scheduled to be held at Lima, Peru, January 25-31, 1947. Professor Garcia Rosell gave a number of lectures on tuberculosis during his stay in those countries.

Dr. Leo Eloesser, F.C.C.P., San Francisco, California, Vice-Chairman of the Council on Pan-American Affairs of the College, was a guest at a dinner given in his honor by the Peruvian Chapter of the College at Lima. Dr. Eloesser lectured at the Sociedad Peruana de Tisiologia.

Dr. Jorge Sarmiento Espejo, a member of the College, of Lima, Peru, is now visiting in the United States of America,

MEXICAN CHAPTER

Financial Report

	<i>Pesos</i>	<i>Dollars</i>
Cash received, June, 1944.....	488.02	101.25
Additional cash received, annual dues	123.70	25.00
Balance on hand, April 30, 1945	611.72	126.25

OCTAVIO BANDALA, M.D., *Secretary-Treasurer*
Mexican Chapter.

TUBERCULOSIS COMMITTEES MEET

The Tuberculosis Committee of the Minnesota State Medical Society held a meeting of the chairmen of the county tuberculosis committees at Minneapolis, on October 26. The meeting was called for the purpose of discussing plans for a state-wide tuberculosis control program by the medical profession. The National Council on Tuberculosis Committees of the College will study the minutes of the meeting and make a further report.

PHILIPPINE RELIEF

A notice was published in the September-October issue of the journal informing the College membership that a committee to administer relief to Fellows of the College in the Philippines was established by the Board of Regents. Our Philippine Fellows have been left homeless and penniless. We quote from a letter received from one of our Fellows in the Philippines:

"The City of San Pablo was totally burned to ashes, including the church, the hospital, city hall, etc. My house was also burned including my pneumothorax clinic wherein I had two x-ray apparatus (50 MA & 100 MA), microscope, pneumothorax apparatus, surgical instruments, library, etc. All personal belongings of my family were also burned.

"I have been fortunate enough for having gone to the mountains with my family and joined the guerrillas and have escaped the massacre of the Japs.

"Dr. Angel Trinidad, one of our Fellows of the College, was not so fortunate. He was captured by the Japs and massacred. His family was left destitute.

"I would like to request the help of the College in securing equipment so that I can re-establish a pneumothorax clinic. I am in need of x-ray equipment, pneumothorax apparatus, microscope and instruments. If the College can help me to secure this equipment and arrange terms for easy payment, agreeable to my poor situation, it would be fully appreciated."

Our Philippine Fellows are not asking for charity and have expressed a desire to pay for whatever equipment we can send them when they have the funds to do so. We appeal to the College members to send their contributions, either in used equipment or in cash, as promptly as possible to Dr. J. C. Placak, 10515 Carnegie Avenue, Cleveland 6, Ohio, Chairman of the Committee for Philippine Relief. The need is urgent, so please send in your contributions without delay.

CAPTAIN ALBERT KAPLAN AWARDED BRONZE STAR MEDAL

Captain Albert Kaplan, MC, U.S.N., served against the Japanese forces on Luzon, Philippine Islands, from 11 January to 30 June 1945. During this time Captain Kaplan served as Company Officer and Platoon Leader in the Clearing Company of an Infantry Division. In this capacity, Captain Kaplan, through untiring effort and application of superior professional skill effectively treated hundreds of wounded and sick patients and returned them to duty in a minimum of time. By virtue of a comprehensive knowledge of his assignment, Captain Kaplan personally supervised moving of equipment and establishing model stations in a most rapid and efficient manner. The constant devotion to duty displayed by Captain Kaplan reflects credit upon himself and the Medical Corps and was in keeping with the highest traditions of the military service.

Headquarters 25th Infantry Division
Office of the Commanding General
APO 25

MEMBERS OF THE COLLEGE RELEASED FROM
THE ARMED SERVICES

Abrams, Maurice James, Major, M.C., 623 Bell Building, Montgomery, Ala.
Altschul, Frank J., Major, M.C., 177 Garfield Ave., Long Branch, N. J.
Applebaum, Irving L., Lt. Col., M.C., 31 Lincoln Park, Newark, N. J.
Ballenger, Irby B., Lt. Comdr. MC-USNR, 212 W. Central Ave., Albuquerque, New Mexico.

Castlen, Charles R., Lt. Col., M.C., 119 N. Central Ave., Glendale, Calif.
Cohen, Fred, Capt. M.C., 339 S. Third Street, Brooklyn, New York.
Brodie, Donald W., Capt. M.C., R.R. No. 2, Box 211, Indianapolis 44, Ind.
Cracovaner, Arthur J., Lt. Col. M.C., 103 East 78th St., New York, N. Y.
DePinto, Dominic A., Capt., M.C., 4938 W. Gladys St., Chicago, Illinois.
Fink, Ira, Major, M.C., 20 Park Avenue, New York, New York.
Gebauer, Paul W., Major, M.C., 3395 Scranton Road, Cleveland, Ohio.
Gerber, Joseph H., Major, M.C., Mt. Airy Road, Croton-on-Hudson, N. Y.
Haft, Dominic J., Capt., M.C., 3222 South May St., Chicago, Illinois.
Hennessy, James J., Lt. Comdr., MC-USNR, 50 Farmington Ave., Hartford, Connecticut.

Homan, Ralph H., Comdr., MC-USNR, 1200 1st. Nat'l. Bldg., El Paso, Tex.
Knoepp, Louis F., Lt. Col., M.C., 5900 Line Ave., Shreveport, Louisiana.
Kottke, Elmer E., Capt., M.C., 10847 Lindbrook Drive, Los Angeles, Calif.
Miller, Louis J., Major, M.C., 3215 West North Ave., Chicago, Illinois.
Ribaud, Charles A., Capt., M.C., 301 East 21st Street, New York, N. Y.
Temples, Powell McRae, Lt., M.C., 178 Victoria Road, Spartanburg, S. C.
Tillou, Donald J., Lt. Col., M.C., 311 Church Street, Elmira, New York.
Weissman, Meyer T., Capt., M.C., 1139 E. Jersey Street, Elizabeth, N. J.
York, Jack Merrill, Capt., M.C., 36 Mentor Avenue, Painesville, Ohio.

Footnote: The Council on Military Affairs would appreciate receiving notices from the College members as soon as they are released from the armed services. Please address the Executive Offices of the College, 500 North Dearborn Street, Chicago 10, Illinois.

College News Notes

Dr. Carl H. Gellenthien, F.C.C.P., Valmora, New Mexico, presented a paper before the meeting of the Bernalillo County Medical Society at Albuquerque on September 12. The title of the paper was "Diagnosis of Pulmonary Tuberculosis."

Dr. Robert A. Peers, F.C.C.P., Colfax, California, has resigned as Mayor of Colfax, which position he has held since 1922. Dr. Peers was recently elected a member of the Board of Trustees of the American Medical Association. He is also Chairman of the Tuberculosis Committee of the California Medical Association.

Dr. William J. Habeeb, F.C.C.P., has been appointed Medical Director of the Clark County Tuberculosis Sanatorium, at Springfield, Ohio. Dr. Habeeb was formerly at the Pinecrest Sanitarium, Beckley, West Virginia.

At the request of the Victorian State Government, Australia, Dr. H. Maxwell James, F.C.C.P., Clinical Tuberculosis Officer, Public Health Dept., Melbourne, and Mr. C. J. Officer Brown have been visiting in the United States and Canada for the past several months. Dr. James is inspecting tuberculosis institutions in the United States and Canada and he will assist in planning the construction of tuberculosis sanatoria in the State of Victoria, Australia. Mr. Brown is visiting the thoracic surgery centers in the United States and Canada and observing the latest techniques in chest surgery.

Dr. Robert K. Campbell, F.C.C.P., Springfield, Illinois, celebrated his twenty-fifth year of service at St. John's Sanitarium on August 7, 1945. Both patients and staff of the hospital joined in the jubilee party.

Dr. Leo Eloesser, F.C.C.P., San Francisco, California, has been assigned as teaching specialist in surgery for the Chinese medical training program of the United Nations Relief and Rehabilitation Administration. The medical training program was planned jointly by UNRRA and CNRRA—the Chinese government relief agency—and is now rapidly getting under way.

Dr. Peter A. Theodos, F.C.C.P., formerly with the Army Medical Corps, has been transferred to UNRRA and is now stationed in Greece.

Lt. Col. Brian B. Blades, M.C., F.C.C.P., Washington, D. C., will present a paper entitled "Recent Advance in the Treatment of Chronic Emphysema," and Dr. Edgar Davis, F.C.C.P., Washington, D. C., will present a paper entitled "Tumors of the Lung," at the Tenth National Assembly of the United States chapter of the International College of Surgeons, to be held December 6-8 at the Mayflower Hotel, Washington, D. C.

Dr. Vera V. Norton, Waverly, Iowa, Fellow Emeritus, American College of Chest Physicians, was honored by having the library at the Dunham Hospital, Cincinnati named for her. Dr. Norton was formerly on the staff of the sanatorium.

Positions Wanted and Available

MEDICAL SERVICE BUREAU

In accordance with a resolution adopted by the Board of Regents of the College at their annual meeting held in Chicago on June 17, 1945, a Medical Service Bureau has been established at the Executive Offices of the College for the purpose of serving the members of the College being released from the armed forces.

The Bureau would appreciate receiving information from the medical superintendents of sanatoria regarding positions available at their institutions, together with full particulars as to the type of position and salary offered. Fellows of the College who are looking for assistants should send complete information to the Bureau.

Physicians being released from the armed forces who are seeking appointments and positions should send complete information to the Bureau regarding their training and the type of position desired.

Please direct all correspondence to the Medical Service Bureau, American College of Chest Physicians, 500 North Dearborn Street, Chicago 10, Illinois.

POSITIONS WANTED

Fellow, American College of Chest Physicians, well trained and experienced in all phases of tuberculosis, desires position as medical director in a 200-300 bed sanatorium. Prefers either New England or California, but will go anywhere in the continental United States. Minimum salary \$4,500 with complete maintenance. For further particulars, address Box 209A, American College of Chest Physicians, 500 North Dearborn Street, Chicago 10, Illinois.

Wanted, position in chest surgery in the west or southwest. Veteran, Associate Member, American College of Chest Physicians, 2 years thoracic surgical training, license in the state of Illinois. For further particulars, address Box 212A, American College of Chest Physicians, 500 North Dearborn St., Chicago 10, Illinois.

Veteran would like position in institution or private clinic. Experienced in tuberculosis treatment and other chest diseases. Can furnish good references. Married, 43 years old, graduated from Virginia Medical College in 1928. Please address Box 213A, American College of Chest Physicians, 500 North Dearborn Street, Chicago 10, Illinois.

Physician would like part-time position while establishing practice. Has been doing general practice, but spent some time in chest work while an interne. Would prefer some place in Chicago or along the North Shore. Please write Box 216A, American College of Chest Physicians, 500 North Dearborn Street, Chicago 10, Illinois.

Position wanted by veteran soon to be released from service. Experienced in

tuberculosis field. Especially interested in associating with a progressive institution. For further information please address Box 218A, American College of Chest Physicians, 500 North Dearborn Street, Chicago 10, Illinois.

Associate Fellow, American College of Chest Physicians, veteran soon to be discharged from the service, experienced in thoracic surgery and bronchoscopy, desires position in sanatorium having proper housing facilities for wife and child, or with private medical group in private practice. Either full or part time. Please address Box 215A, American College of Chest Physicians, 500 North Dearborn Street, Chicago 10, Illinois.

Veteran of four years service, graduate of University of Maryland, 1937, resident in internal medicine three years, qualified for Boards, desires part time position in or near Chicago. For further particulars address Box 214A, American College of Chest Physicians, 500 North Dearborn Street, Chicago 10, Illinois.

Veteran, Loyola University School of Medicine graduate, 1940, four years medical service, would like residency in an approved hospital, or part time position in private practice. For further particulars write Box 211A, American College of Chest Physicians, 500 North Dearborn Street, Chicago 10, Illinois.

Veteran, graduate University of Illinois College of Medicine, 1943, some experience in chest diseases, desires part time position in private practice in or near Chicago. Would also consider residency in approved hospital. For further information write Box 210A, American College of Chest Physicians, 500 North Dearborn Street, Chicago 10, Illinois.

POSITIONS AVAILABLE

Position available for Director of Division of Tuberculosis Control for the Seattle Department of Health, January 1, 1946. Applicant must be able to obtain license in the State of Washington; must have specialized tuberculosis training or experience in public health. Position is full time and pays \$5,940 plus reimbursement for travel. Apply to Emil E. Palmquist, M.D., Commissioner of Health.

Junior physician wanted for sanatorium in east. Initial salary \$2,040 annually plus maintenance. Should be experienced in tuberculosis sanatorium treatment. Will teach pneumothorax. Also, Senior physician, salary \$2,880 annually with maintenance. Applicants may be married but without young children as quarters are inadequate. Class A medical school. Massachusetts license also desirable. For further information address Box 118A, American College of Chest Physicians, 500 North Dearborn Street, Chicago 10, Illinois.

Two physicians needed at 665 bed sanatorium in West Virginia who are trained in the treatment and management of adult, tuberculous patients. Salary starts at \$225, with \$25 raise each six months until \$300 per month is reached, with full maintenance. For further particulars please address Box 117A, American College of Chest Physicians, 500 North Dearborn St., Chicago 10, Illinois.

Physician wanted for private chest clinic, knowledge of x-ray interpretation, pneumothorax experience and fairly well-rounded knowledge of tuberculosis treatment. House available for married physician. Must be eligible for Michigan license. Initial salary \$600.00 per month. For further information address Box 120A, American College of Chest Physicians, 500 North Dearborn Street, Chicago 10, Illinois.

Position available in State Health Department. Physician who is experienced in chest work and is able to read chest x-ray films will be considered. For further particulars write Box 121A, American College of Chest Physicians, 500 North Dearborn Street, Chicago 10, Illinois.

Positions available for two physicians in 185 bed county sanatorium in Indiana. Institution is approved by the American College of Surgeons and is a member of the American Hospital Association. Facilities for training in thoracic surgery and bronchoscopy and an active out-patient service is maintained. Salary \$150 to \$350 per month in addition to maintenance for a small family. For further particulars address Box 122A, American College of Chest Physicians, 500 North Dearborn Street, Chicago 10, Illinois.

Four residencies in tuberculosis will be available in an eastern state tuberculosis sanatorium. Men and women physicians, single or married, will be accepted. Residents will receive an opportunity for good training in tuberculosis and other chest diseases, as 25 per cent of our admissions are non-tuberculous. Active collapse therapy and major thoracic surgery are maintained at the institution. Salary for untrained physicians begin at \$175 per month plus complete maintenance. Married physicians with families can be housed. For further particulars write Box 123A, American College of Chest Physicians, 500 North Dearborn Street, Chicago 10, Illinois.

Positions available for qualified chest specialists in the Veterans Administration. For full particulars address the Acting Surgeon General, Veterans Administration, Washington 25, D. C.

Positions available for physicians in state sanatorium in the south. For further particulars address Box 124A, American College of Chest Physicians, 500 North Dearborn Street, Chicago 10, Ill.

DISEASES OF THE CHEST

AUTHOR INDEX

Volume XI, January - December, 1945

- | | | | |
|---|----------|---|-----|
| <i>Acuña, Ricardo Tapia.</i> Bronchoscopy in Pulmonary Tuberculosis..... | 392 | <i>de Abreu, Manoel.</i> The Bearers of Shadows | 639 |
| <i>Adamson, Col. J. D.</i> Symposium—Tuberculosis in World War II—In the Canadian Army..... | 272 | <i>DeBakey, Michael, Alton Ochsner, and J. Leonard Dixon.</i> Primary Bronchiogenic Carcinoma..... | 97 |
| <i>Baldo, Jose Ignacio.</i> The Tuberculosis Problem and the Organization of the Tuberculosis Campaign in Venezuela | 259 | <i>Desjardins, Arthur U.</i> Roentgen Treatment for Hodgkin's Disease and Lymphosarcoma of the Chest | 565 |
| <i>Banyai, Andrew L.</i> Introduction — Symposium on Roentgenology..... | 497 | <i>Dixon, J. Leonard, Alton Ochsner, and Michael DeBakey.</i> Primary Bronchiogenic Carcinoma..... | 97 |
| <i>Bettag, O. L.</i> Tuberculosis in Prisons | 313 | <i>Domm, Lt. (jg) Sheldon.</i> Rev. Diseases of the Chest, by Robert Coope | 494 |
| <i>Bettman, Ralph B.</i> Surgical Procedures in Non-Tuberculosis Diseases | 440 | <i>Duncan, Captain Robert E.</i> Symposium—Tuberculosis in World War II—From the Navy Standpoint | 269 |
| <i>Birkelo, C. C., and L. A. Poznak.</i> The Radiological Findings in Tracheo-Bronchial Tuberculosis..... | 26 | <i>Feinsilver, Oscar.</i> Mechanical Paralysis of the Left Hemidiaphragm Complicating Collapse Therapy in Pulmonary Tuberculosis | 138 |
| <i>Bisaillon, Marr.</i> Rev. Principles and Practices of Inhalational Therapy, by Alvan L. Barach..... | 201, 495 | <i>Foster - Carter, A. F., and Clifford Hoyle.</i> The Segments of the Lungs. A Commentary on Their Investigation and Morbid Radiology..... | 511 |
| <i>Blades, Lt. Col. Brian.</i> The Segments of the Lungs From the Standpoint of Surgical Procedures..... | 203 | <i>Garland, Commander L. Henry.</i> Intrathoracic Metallic Foreign Bodies | 662 |
| <i>Boynton, Ruth E.</i> Tuberculosis in American Colleges and Universities | 340 | <i>Goodman, Morton J.</i> Rev. The Practice of Medicine, by Jonathan C. Meakins | 202 |
| <i>Brown, Florence A.</i> Rev. Artificial Pneumothorax in Pulmonary Tuberculosis Including Its Relationship to the Broader Aspects of Collapse Therapy, by T. N. Rafferty.... | 296 | <i>Gould, David M., and Herman E. Hill-eboe.</i> Symposium — Tuberculosis in World War II—Tuberculosis Control in Industry..... | 278 |
| <i>Brown, Samuel.</i> The Lateral Projection of the Chest..... | 596 | <i>Grebe, Guillermo, and H. Orrego Puelma.</i> Analysis of One Hundred Cases of Minimal Pulmonary Tuberculosis | 375 |
| <i>Burns, Herbert A.</i> Tuberculosis in Institutions for the Mentally Ill..... | 304 | <i>Hendricks, Chas. M.</i> Manpower and Tuberculosis. Council on Military Affairs and Public Health..... | 163 |
| <i>Cohen, Milton B.</i> Irreversible Allergy in Non-Tuberculous Diseases of the Chest | 236 | | |
| <i>Davison, Richard.</i> Indications for Collapse Therapy | 423 | | |

- Hendricks, Chas. M.* Symposium—Tuberculosis in World War II—Council on Military Affairs and Public Health 266
- Hilleboe, Herman E., and David M. Gould.* Symposium—Tuberculosis in World War II—Tuberculosis Control in Industry 278
- Hochhauser, Edward.* Socio-Economic Problems in the Rehabilitation of the Tuberculous 356
- Holinger, Paul H.* Recent Advances in Bronchoscopic Technic 427
- Hollender, A. R., and Paul B. Szanto.* Tuberculosis of the Nasopharynx—Its Frequent Incidence and Clinical Significance 227
- Holman, Charles N.* Rev. Synopsis of Diseases of the Heart and Arteries, by George R. Herrmann 200, 295
- Hoyle, Clifford, and A. F. Foster-Carter.* The Segments of the Lungs. A Commentary on Their Investigation and Morbid Radiology 511
- Joannides, Minas.* Introduction. Refresher Course on Diseases of the Chest 398
- Katz, Louis N.* Pulmonary Embolism 249
- Leonidoff, Col. A. A.* Inaugurates Novel Plan for Training Chinese Medical Students 287
- Levine, Edwin R.* The Treatment of Bronchiectasis 431
- Lewis, Ira, and Russell H. Morgan.* The Roentgen Ray: Its Past and Future 502
- Long, Colonel Esmond R.* Discussion of Papers. Symposium—Tuberculosis in World War II 281
- MacDowell, Affonso.* Tuberculosis and Pregnancy 256
- Macklin, Charles C.* Length and Width Changes in the Pulmonary Arterial System of Rabbits in Passing from the Stage of Expiration to that of Collapse as Revealed by Roentgenography 590
- Marietta, Maj. Gen. S. U.* Reconditioning of Military Personnel as Carried Out in the Army 156
- Marietta, Maj. Gen. S. U.* Symposium—Tuberculosis in World War II—The Army Viewpoint 267
- Meissner, William A.* Surgical Pathology of Endobronchial Tuberculosis 18
- Meixner, Fred M. F.* Pregnancy in Tuberculosis 409
- Morgan, Russell H.* Automatic Exposure Control in Photofluorography 150
- Morgan, Russell H., and Ira Lewis.* The Roentgen Ray: Its Past and Future 502
- Myers, Jay Arthur.* President's New Year Message 93
- Nalls, Lt. Col. Walter L.* Pitfalls in the Diagnosis of Atypical Pneumonia 130
- Nixon, James W.* Surgical Closure of the Patent Ductus Arteriosus 241
- Novak, Julius B.* Management of Minimal Tuberculosis 405
- Ochsner, Alton, J. Leonard Dixon, and Michael DeBakey.* Primary Bronchiogenic Carcinoma 97
- Overholt, Richard H., and Norman J. Wilson.* Pulmonary Resection for Tuberculosis Complicated by Tuberculous Bronchitis (Preliminary Report) 72
- Paul, Lester W.* Neurogenic Tumors at the Pulmonary Apex 648
- Peabody, J. Winthrop.* Speakers Bureau. Council on Postgraduate Medical Education 163
- Petter, Charles K.* Chemotherapy of Tuberculosis 419
- Pfuetze, Karl H., and Marjorie Pyle.* Diasone in Treatment of Pulmonary Tuberculosis 213
- Pfuetze, Karl H.* Present Status of Chemotherapy in Tuberculosis from the Clinical Standpoint 220

- Post, Joseph W.* Symposium—Tuberculosis in World War II—From the Viewpoint of a Radiologist 275
- Poznak, L. A., and C. C. Birkelo.* The Radiological Findings in Tracheo-Bronchial Tuberculosis 26
- Puelma, H. Orrego, and Guillermo Grebe.* Analysis of One Hundred Cases of Minimal Pulmonary Tuberculosis 375
- Pyle, Marjorie, and Karl H. Pfuetze.* Diasone in Treatment of Pulmonary Tuberculosis 213
- Rienhoff, William F., Jr.* Discussion. Primary Bronchiogenic Carcinoma, by Alton Ochsner, J. Leonard Dixon, and Michael DeBakey 127
- Schlack, Otto C.* Introduction. Symposium on Tuberculosis in Institutions 297
- Silverman, Gertrude.* Tuberculosis of the Trachea and Major Bronchi 3
- Spector, H. I.* Loeffler's Syndrome (Transient Pulmonary Infiltrations With Eosinophilia) 380
- Speros, James T.* Rev. Radiation and Climatic Therapy of Chronic Pulmonary Diseases with Special Reference to Natural and Artificial Heliotherapy, X-ray Therapy, and Climatic Therapy of Chronic Pulmonary Diseases and All Forms of Tuberculosis, by Edgar Mayer 494
- Stewart, Chester A.* Tuberculosis Control Programs 298
- Stone, Moses J.* Introduction. Symposium on Tracheobronchial Tuberculosis 1
- Stone, Moses J.* Introduccion. Bronquitis Tuberculosa 2
- Stone, Moses J.* Clinical Aspects of Endobronchial Tuberculosis 60
- Szanto, Paul B., and A. R. Hollender.* Tuberculosis of the Nasopharynx—Its Frequent Incidence and Clinical Significance 227
- Taylor, Henry K.* Clinical Value of Angiocardiography 624
- Turner, Paul A.* Discussion. Pitfalls in the Diagnosis of Atypical Pneumonia, by Lt. Col. Walter L. Nalls 136
- Webb, Arthur S.* The Present Status of Tuberculosis in Children 399
- Wilson, Norman J.* Bronchoscopic Observations in Tuberculous Tracheobronchitis 36
- Wilson, Norman J., and Richard H. Overholt.* Pulmonary Resection for Tuberculosis Complicated by Tuberculous Bronchitis (Preliminary Report) 72
- Wolford, Colonel Roy A.* Symposium—Tuberculosis in World War II—Tuberculous Veterans of World War II: An Analysis 273
- Wolford, Colonel Roy A.* The Care of the Tuberculous Veteran 351

DISEASES OF THE CHEST

SUBJECT INDEX

Volume XI, January - December, 1945

- A**LLERGY, Irreversible—in Non-Tuberculous Diseases of the Chest. *Milton B. Cohen*..... 236
- Analysis of One Hundred Cases of Minimal Pulmonary Tuberculosis. *H. Orrego Puelma and Guillermo Grebe*..... 375
- Analysis of Tuberculosis Mortality in the United States for 1943..... 285
- Angiocardiography, Clinical Value of—. *Henry K. Taylor*..... 624
- Artificial Pneumothorax in Pulmonary Tuberculosis. *T. N. Rafferty*. Rev. 296
- Atypical Pneumonia, Pitfalls in the Diagnosis of—. *Lt. Col. Walter L. Nalls*..... 130
- Automatic Exposure Control in Photofluorography. *Russell H. Morgan* 150
- B**EARERS of Shadows. *Manoel de Abreu*..... 639
- Bronchiectasis, Treatment of—. *Edwin R. Levine*..... 431
- Bronchiogenic Carcinoma, Primary—. *Alton Ochsner, J. Leonard Dixon and Michael DeBakey*..... 97
- Bronchoscopic Observations in Tuberculous Tracheobronchitis: Clinical and Pathological Correlation. *Norman J. Wilson*..... 36
- Bronchoscopic Technic, Recent Advances in—. *Paul H. Holinger*..... 427
- Bronchoscopy in Pulmonary Tuberculosis. *Ricardo Tapia Acuña*..... 392
- C**ARCINOMA, Primary Bronchiogenic—. *Alton Ochsner, J. Leonard Dixon and Michael DeBakey*.... 97
- Care of the Tuberculous Veteran. *Col. Roy A. Wolford*..... 351
- Chemotherapy of Tuberculosis. *Charles K. Petter*..... 419
- Chemotherapy in Tuberculosis, Present Status of—from the Clinical Standpoint. *Karl H. Pfuetze*..... 220
- Children, Present Status of Tuberculosis in—. *Arthur S. Webb*..... 399
- Clinical Aspects of Endobronchial Tuberculosis. *Moses J. Stone*..... 60
- Clinical Value of Angiocardiography. *Henry K. Taylor*..... 624
- Collapse Therapy, Mechanical Paralysis of the Left Hemidiaphragm Complicating—in Pulmonary Tuberculosis. *Oscar Feinsilver*..... 138
- Collapse Therapy, Indications for—. *Richard Davison*..... 423
- D**IASONE in Treatment of Pulmonary Tuberculosis. *Karl H. Pfuetze and Marjorie Pyle*..... 213
- Diseases of the Chest. *Robert Coope*. Rev. 494
- Diseases of the Chest, Refresher Course on—. Introduction. *Minas Joannides*..... 398
- Diseases of the Heart and Arteries, Synopsis of—. *George R. Herrmann*. Rev. 200; 295
- E**MBOLISM, Pulmonary—. *Louis N. Katz*..... 249
- Endobronchial Tuberculosis, Clinical Aspects of—. *Moses J. Stone*..... 60
- Endobronchial Tuberculosis, Surgical Pathology of—. *William A. Meissner* 18
- F**OREIGN Bodies, Intrathoracic Metallic—. *Commander L. Henry Garland*..... 662

H EART and Arteries, Synopsis of Diseases of— *George R. Hermann*. Rev. 200, 295

Hodgkin's Disease and Lymphosarcoma of the Chest, Roentgen Treatment of— *Arthur U. Desjardins* ... 565

I NDICATIONS for Collapse Therapy. *Richard Davison* 423

"Information Please in Medicine" 365

Inhalational Therapy, Principles and Practice of — *Alvan L. Barach*. Rev. 201, 495

Intrathoracic Metallic Foreign Bodies. *Commander L. Henry Garland* 662

Irreversible Allergy in Non-Tuberculous Diseases of the Chest. *Milton B. Cohen* 236

L ATERAL Projection of the Chest. *Samuel Brown* 596

Length and Width Changes in the Pulmonary Arterial System of Rabbits in Passing from the Stage of Expiration to That of Collapse as Revealed by Roentgenography. *Charles C. Macklin* 590

Loeffler's Syndrome (Transient Pulmonary Infiltration with Eosinophilia). Report of a Case and Review of the Available Literature. *H. I. Spector* 380

Lungs, Segments of the—, Their Investigation and Morbid Radiology. *A. F. Foster-Carter and Clifford Hoyle* 511

Lymphosarcoma of the Chest, Roentgen Treatment for Hodgkin's Disease and— *Arthur U. Desjardins* ... 565

M ANAGEMENT of Minimal Tuberculosis. *Julius B. Novak* 405

Manpower and Tuberculosis. Council on Military Affairs and Public Health 161

Mechanical Paralysis of the Left Hemidiaphragm Complicating Collapse Therapy in Pulmonary Tuberculosis. *Oscar Feinsilver* 138

Medical Students, Colonel Leonidoff Inaugurates Novel Plan for Training Chinese— 287

Mentally Ill, Tuberculosis in Institutions for— *Herbert A. Burns* 304

Military Personnel, Reconditioning of—as Carried Out in the Army. *Maj. Gen. Shelley U. Marietta* 156

Minimal Pulmonary Tuberculosis, Analysis of One Hundred Cases of— *H. Orrega Puelma and Guillermo Grebe* 375

Mortality, Analysis of Tuberculosis in the United States for 1943 285

N ASOPHARYNX, Tuberculosis of—, Its Frequent Incidence and Clinical Significance. *A. R. Hollender and Paul B. Szanto* 227

Neurogenic Tumors at the Pulmonary Apex. *Lester W. Paul* 648

Non-Tuberculous Diseases, Surgical Procedures in— *Ralph B. Bettman* 440

OBITUARIES

Archer, Isaac James 294

Bennett, William Frederick 491

Fine, M. James 200

Matson, Ralph Charles 686

Parker, Harold F. 294

Ringo, Hugh Fay 295

P ARALYSIS, Mechanical—of the Left Hemidiaphragm Complicating Collapse Therapy in Pulmonary Tuberculosis. *Oscar Feinsilver* 138

Patent Ductus Arteriosus, Surgical Closure of— *James W. Nixon* 241

Photofluorography, Automatic Exposure Control in— *Russel H. Morgan* 150

Pitfalls in the Diagnosis of Atypical Pneumonia. *Lt. Col. Walter L. Nalls* 130

Practice of Medicine. *Jonathan C. Meakins*. Rev. 202

Pregnancy in Tuberculosis. *Fred M. F. Meixner* 409

- Pregnancy, Tuberculosis and —. *Afonso MacDowell* 256
- Present Status of Chemotherapy in Tuberculosis from the Clinical Standpoint. *Karl H. Pfuete* 220
- Present Status of Tuberculosis in Children. *Arthur S. Webb* 399
- Primary Bronchiogenic Carcinoma. *Alton Ochsner, J. Leonard Dixon and Michael DeBakey* 97
- Principles and Practice of Inhalational Therapy. *Alvan L. Barach*. Rev. 201, 495
- Prisons, Tuberculosis in—. *O. L. Bettag* 313
- Pulmonary Arterial System, Length and Width Changes in the—of Rabbits in Passing From the Stage of Expiration to That of Collapse as Revealed by Roentgenography. *Charles C. Macklin* 590
- Pulmonary Embolism. *Louis N. Katz* 249
- Pulmonary Resection for Tuberculosis Complicated by Tuberculous Bronchitis. (Preliminary Report). *Richard H. Overholt and Norman J. Wilson* 72
- Pulmonary Tuberculosis, Analysis of One Hundred Cases of Minimal—. *H. Orrega Puelma and Guillermo Grebe* 375
- Pulmonary Tuberculosis, Bronchoscopy in—. *Ricardo Tapia Acuña* 392
- Pulmonary Tuberculosis, Diasone in the Treatment of—. *Karl H. Pfuete and Marjorie Pyle* 213
- R**ADIATION and Climatic Therapy of Chronic Pulmonary Disease. Edited by Edgar Mayer. Rev. 494
- Radiological Findings in Tracheo-Bronchial Tuberculosis. *C. C. Birkelo and L. A. Poznak* 26
- Recent Advances in Bronchoscopic Technic. *Paul H. Holinger* 427
- Reconditioning of Military Personnel as Carried Out in the Army. *Maj. Gen. S. U. Marietta* 156
- Refresher Course on Diseases of the Chest, Introduction. *Minas Joanides* 398
- Rehabilitation of the Tuberculous, Socio-Economic Problems in the—. *Edward Hochhauser* 356
- Roentgen Ray: Its Past and Future. *Russell H. Morgan and Ira Lewis* 502
- Roentgen Treatment for Hodgkin's Disease and Lymphosarcoma of the Chest. *Arthur U. Desjardins* 565
- S**EGMENTS of the Lungs: A Commentary on Their Investigation and Morbid Radiology. *A. F. Foster-Carter and Clifford Hoyle* 511
- Segments of the Lungs from the Standpoint of Surgical Procedures. *Lt. Col. Brian Blades* 203
- Shadows, The Bearers of—. *Manoel de Abreu* 639
- Socio-Economic Problems in the Rehabilitation of the Tuberculous. *Edward Hochhauser* 356
- Surgical Closure in the Patent Ductus Arteriosus. *James W. Nixon* 241
- Surgical Pathology of Endobronchial Tuberculosis. *William A. Meissner* 18
- Surgical Procedures in Non-Tuberculous Diseases. *Ralph B. Bettman* 440
- Symposium on Tracheo-Bronchial Tuberculosis. Introduction. *Moses J. Stone* 1
- Symposium on Tuberculosis in Institutions. Introduction. *Otto C. Schlack* 297
- Symposium on Tuberculosis in World War II 267-283
- Symposium on Roentgenology. Introduction. *Andrew L. Banyai* 497
- Symposium on Roentgenology, Commemorating the 50th Anniversary of the Discovery of the X-Ray by William Konrad Roentgen 497-685
- Synopsis of Diseases of the Heart and Arteries. *George R. Herrmann*. Rev. 200, 295

- THERAPY of Chronic Pulmonary Diseases, Radiation and Climatic—**. Edited by Edgar Mayer. Rev. 494
- Tracheobronchial Tuberculosis, Radiological Findings in—. *C. C. Birkelo and L. A. Poznak*..... 26
- Transient Pulmonary Infiltrations With Eosinophilia. *H. I. Spector*..... 380
- Treatment of Bronchiectasis. *Edwin R. Levine*..... 431
- Tuberculosis and Pregnancy. *Affonso MacDowell* 256
- Tuberculosis, Chemotherapy of—. *Charles K. Petter*..... 419
- Tuberculosis, Clinical Aspects of Endobronchial—. *Moses J. Stone*..... 60
- Tuberculosis Control in Industry. *Herman E. Hilleboe and David M. Gould* 278
- Tuberculosis Control Programs. *Chesster A. Stewart*..... 298
- Tuberculosis in American Colleges and Universities. *Ruth E. Boynton* 340
- Tuberculosis in Children, Present Status of—. *Arthur S. Webb*..... 399
- Tuberculosis in Institutions for the Mentally Ill. *Herbert A. Burns*..... 304
- Tuberculosis in Prisons. *O. L. Bettag* ... 313
- Tuberculosis in World War II, Symposium:
- The Army Viewpoint.
 Maj. Gen. Shellep U. Marietta 267
- From the Navy Standpoint.
 Capt. Robert E. Duncan..... 269
- In the Canadian Army.
 Col. J. D. Adamson..... 272
- Tuberculous Veterans of World War II: An Analysis. *Col. Roy A. Wolford* 273
- From the Viewpoint of a Radiologist. *Joseph W. Post*..... 275
- Tuberculosis Control in Industry.
 Herman E. Hilleboe and David M. Gould 278
- Discussion of Papers.
 Col. Esmond R. Long..... 281
- Tuberculosis, Management of Minimal—. *Julius B. Novak*..... 405
- Tuberculosis, Manpower and—. Council on Military Affairs and Public Health 161
- Tuberculosis Mortality, Analysis of—in the United States for 1943 285
- Tuberculosis of the Nasopharynx—Its Frequent Incidence and Clinical Significance. *A. R. Hollender and Paul B. Szanto*..... 227
- Tuberculosis of the Trachea and Major Bronchi. *Gertrude Silverman*..... 3
- Tuberculosis, Pregnancy in—. *Fred M. F. Meizner*..... 409
- Tuberculosis Problem and the Organization of the Tuberculosis Campaign in Venezuela. *Jose Ignacio Baldo* 259
- Tuberculosis, Surgical Pathology of Endobronchial—. *William A. Meissner* 18
- Tuberculous Bronchitis, Pulmonary Resection for Tuberculosis Complicated by—. *Richard H. Overholt and Norman J. Wilson* 72
- Tuberculous Tracheobronchitis, Bronchoscopic Observations in—, Clinical and Pathological Correlation. *Norman J. Wilson*..... 36
- Tumors, Neurogenic—at the Pulmonary Apex. *Lester W. Paul* 648
- VENEZUELA, Tuberculosis Problem and the Organization of the Tuberculosis Campaign in—**. *Jose Ignacio Baldo*..... 259
- Veteran, Care of the Tuberculous—. *Col. Roy A. Wolford*..... 351

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REPRINTS

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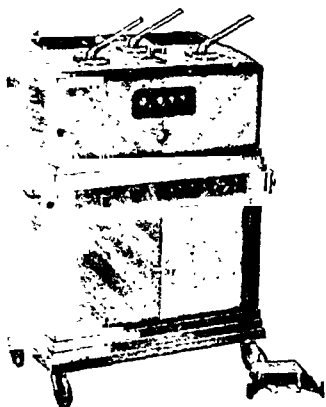
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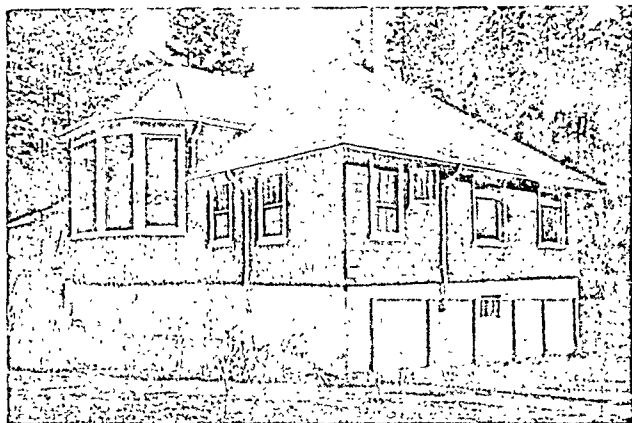


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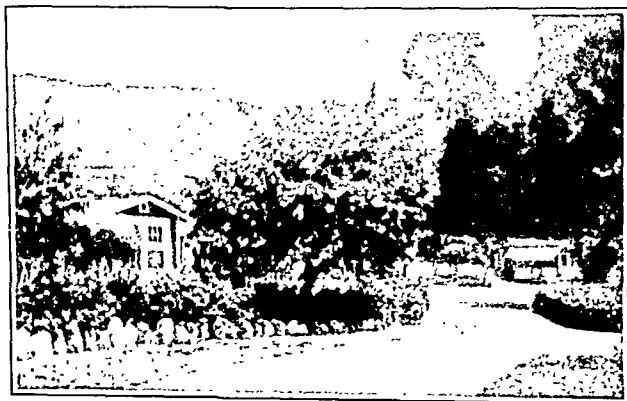
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